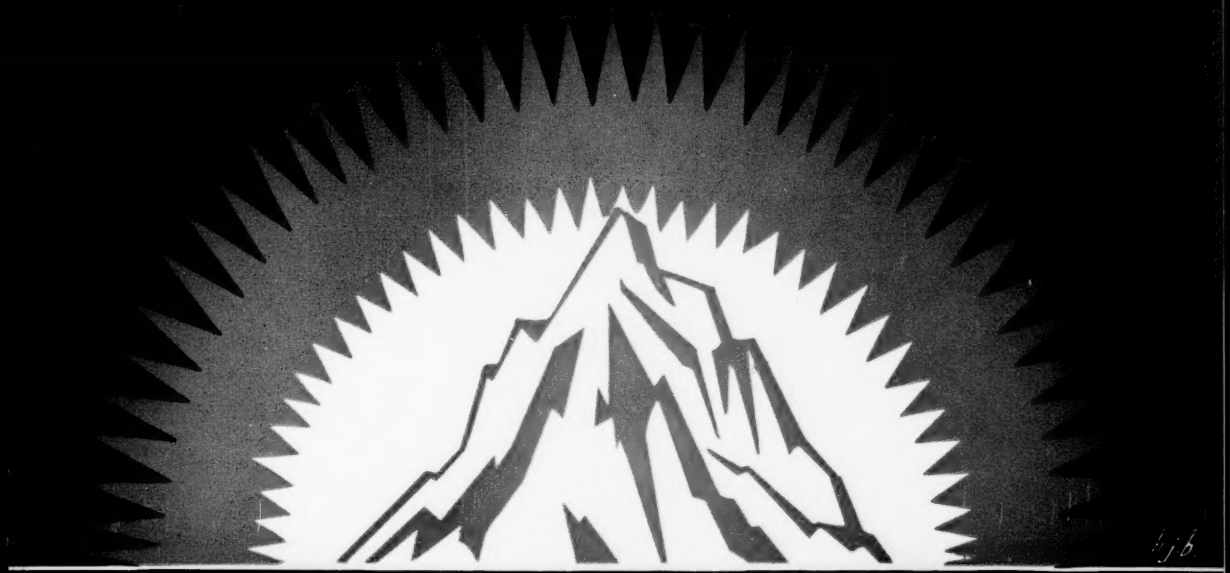
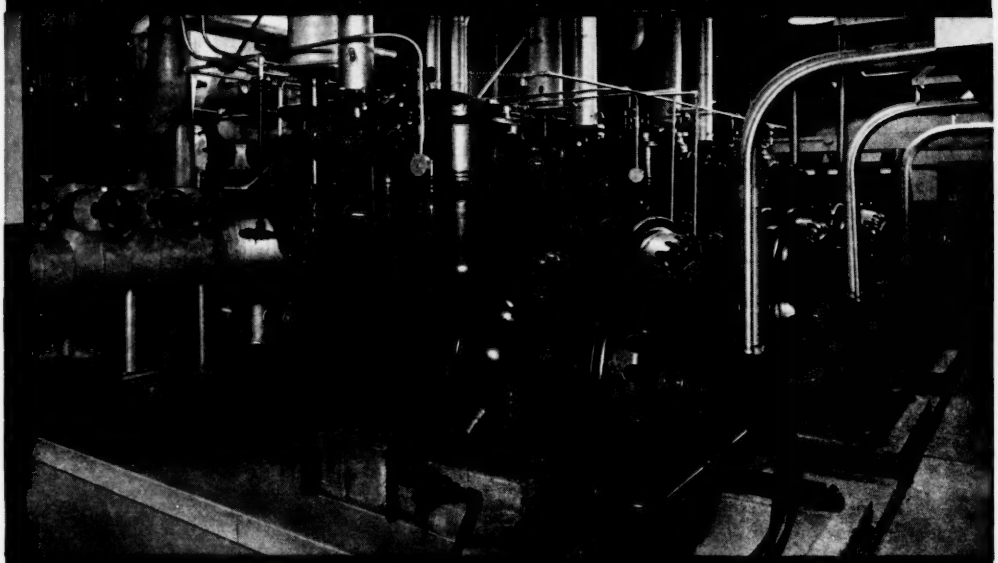
ICE AND Refrigeration



PUBLISHED BY NICKERSON & COLLINS CO., CHICAGO - NEW YORK

58th YEAR ★ MAY, 1949

INCREASE TONNAGE...



REDUCE COSTS

Photo from Vilter Mfg. Co.

Assure clean, trouble-free compressor operation by using Texaco Capella Oils

IN the experience of operators everywhere, *Texaco Capella Oils* assure the clean compressors and coils that mean faster refrigerating, fewer servicings, and lower maintenance costs.

Texaco Capella Oils do not react with refrigerants. They are moisture-free and have very low pour tests. In addition, these highly refined oils effectively resist formation of carbon, sludge and gum. Thus, both compressors and coils stay clean, assuring maximum tonnage at minimum cost.

Whatever the size or type of your compressors, there are *Texaco Capella Oils* in suitable viscosities to keep them running at peak efficiency and economy. A Texaco Lubrication Engineer will gladly help you select the right one for your needs.

Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO Capella Oils

FOR ALL AIR CONDITIONING AND REFRIGERATING EQUIPMENT

TEXACO

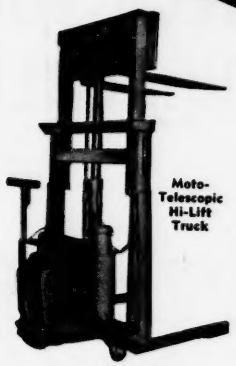
Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.

ICE AND REFRIGERATION, Nickerson & Collins Co., Publishers, 433-435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 116, No. 5, May, 1949. Entered as second-class matter August 8, 1891, Chicago, Ill., under the Act of March 3, 1879. Additional entry at Beloit, Wis., April 20, 1948. Copyright 1949. Subscription in the U. S. $3.00 per year; other countries $4.00.

Up to 15" SHORTER In OVERALL LENGTH

ORIGINATORS OF MOTORIZED HAND TRUCKS

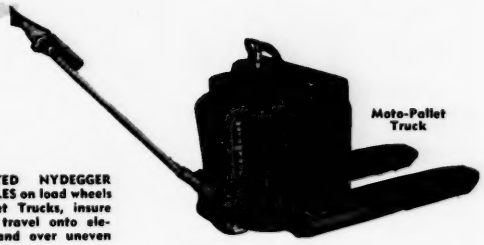
The MOTO-TRUC Co. 1953 East 59th Street • Cleveland 3, Ohio



MOTO-TRUC MOTORIZED HAND TRUCKS

Exclusive
MOTO-TRUC FEATURES:

- Shortest Overall Length.
- Lowest Center of Gravity.
- Natural Roller Grip Handle.
- Interchangeable Power Unit.
- Simplified for Service.
- Integral Electric Pump and Valve Unit.
- Stabilized 4-Point Load Support on Hi-Lifts.
- Constant Traction through Articulating Hinged Spring Unit which holds Drive Wheel Down.



PATENTED NYDEGGER SHACKLES on load wheels of Pallet Trucks, insure smooth travel onto elevators and over uneven floors, etc.

Moto-Trucs were designed for cold storage work. They have been tested, approved and bought by the largest cold storage companies in America.

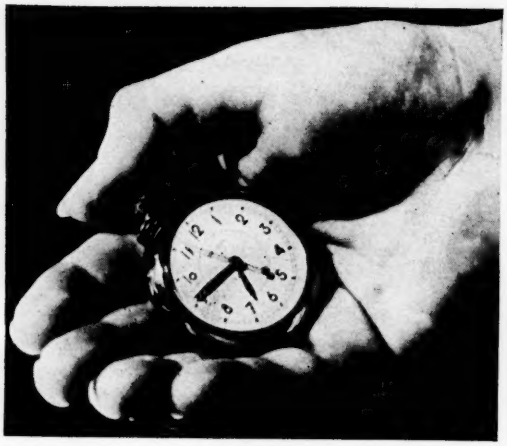
All switches, wires, insulation and lubricants are not affected by moisture or temperature changes from 100° plus to 40° minus.

•

WRITE FOR BULLETIN No. 49

Describing All Moto-Truc Advantages

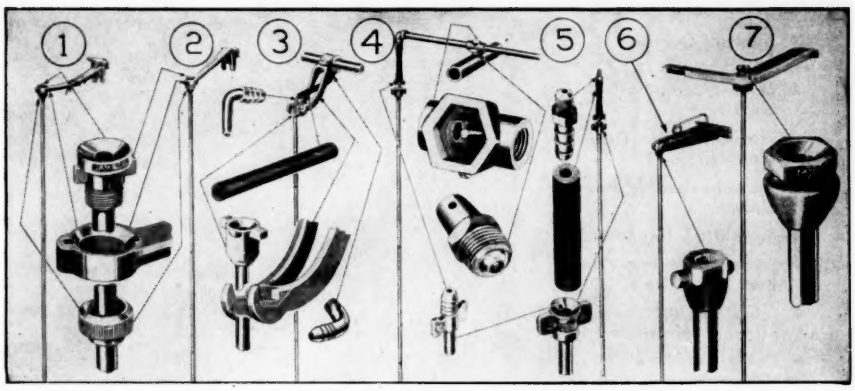
The MOTO-TRUC Co.
1953 E. 59th Street
CLEVELAND 3, OHIO.
ORIGINATORS OF MOTORIZED HAND TRUCKS



TIME
to
CHECK YOUR REQUIREMENTS

MARTOCELLO *"CHECKS"* ON EVERY POINT

V phone, write or wire *V prompt shipments* *V attractive prices*



THE ILLUSTRATION ABOVE SHOWS THE FOLLOWING CLEAR ICE MAKING SYSTEMS

1. MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Offset Form
2. MARTOCELLO SELF-CENTERING DROP TUBE BRACKET, Straight Form
3. MARTOCELLO SERIES DROP TUBE BRACKET
4. DOUBLE BRACKET SYSTEM ASSEMBLY
5. SERIES DROP TUBE ASSEMBLY
6. GALVANIZED STEEL TRUNNION TYPE BRACKET ASSEMBLY
7. GALVANIZED STEEL SADDLE BRACKET ASSEMBLY

Everything for the Ice Industry

Represented on the West Coast by

Western Ice Equipment Company

420 Market Street, San Francisco 11, California

Jos. A. Martocello & Co. 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

"Serving the Ice Industry Since 1916"..."There is no Substitute for **MARTOCELLO QUALITY"**

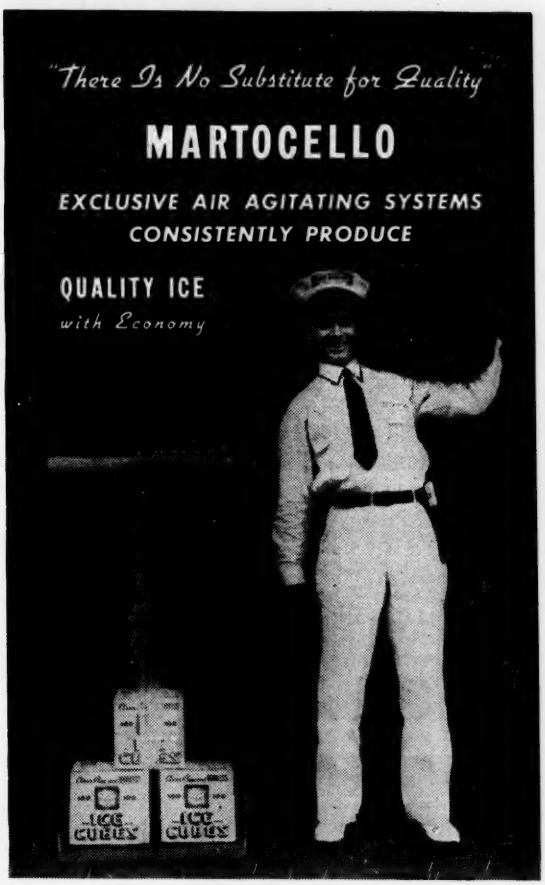
Martocello offers a COMPLETE SERVICE

MARTOCELLO Complete Line of ICE MAKING EQUIPMENT and SUPPLIES

gives OPERATION ECONOMY

with IMPROVED QUALITY

and INCREASED SALES



Compare Prices

Send for our NEW Attractive PRICE LIST today

LET US QUOTE YOU OR SEND YOUR ORDERS IN NOW. COMPARE QUALITY AND PRICE AND SEE WHY MARTOCELLO WINS OUT EVERY TIME.

Jos. A. Martocello & Co.

229-231 NORTH 13th STREET
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"Serving the Ice Industry Since 1916" . . *"There is no Substitute for* **MARTOCELLO QUALITY"**

PLAN NOW

TO CUT POWER COST

AND BOOST TONNAGE WITH

Vogt BRINE COOLERS

WRITE FOR COMPLETE DETAILS
ASK FOR BULLETIN BC2

DOWN GOES POWER COST AND UP GOES TONNAGE when old evaporators are replaced with modern, Vogt Brine Coolers. The reason . . . maximum evaporating surface packed into a minimum of space with correct design and sound construction the controlling factors.

Vertical Multipass type coolers can be furnished for use where floor space is limited and ample head room is available.

MULTIPASS TYPE

The cooler for closed brine systems in cold storage plants, dairies, packing plants, oil refineries, etc., requiring units of large capacity.

LOWER YOUR POWER COST

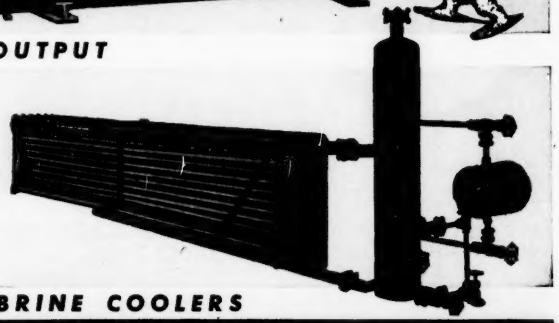
SINGLEPASS TYPE

Standard for ice freezing tanks and ideal where multiple can lifts are used. Large gas liberation area and rapid circulation of brine makes this a very efficient unit.

RAISE TONNAGE OUTPUT

COIL TYPE

Recommended for ice freezing tanks and other refrigerating purposes where space is limited. The gas is quickly liberated and a high rate of heat transfer is effected.



INSTALL MODERN VOGT BRINE COOLERS

HENRY VOGT MACHINE CO., Inc., ... LOUISVILLE 10, KENTUCKY

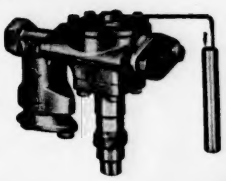
Branch Offices: New York - Chicago - Cleveland - Philadelphia - Dallas

ALCO AUTOMATIC AMMONIA CONTROLS

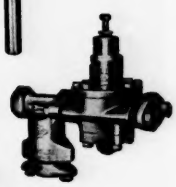
keep your operating costs "sub-normal"

THE COMPLETE LINE FOR *EVERY* AMMONIA APPLICATION

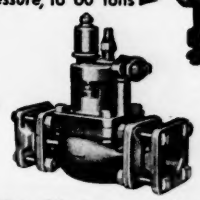
EXPANSION VALVES: *Thermostatic,* to 125 tons ►



EXPANSION VALVES: *Constant Pressure,* to 60 tons ►



EVAPORATOR OR "BACK-PRESSURE" REGULATORS: to 290 tons ►



SOLENOID VALVES: *Liquid*—to 172 tons
Suction—to 28 tons. ⅜" to 2" pipe connections ►

HIGH PRESSURE FLOAT VALVES: to 20 tons ►

FLOAT SWITCHES: up to 480 volts ►

STRAINERS: up to 2" pipe size ►

We also make a complete line of automatic refrigerant control valves for "Freon-12", Methyl Chloride, etc.

ALCO VALVE CO.

835 KINGSLAND AVE. • ST. LOUIS 5, MO.

SEND FOR OUR AMMONIA CONTROL BULLETIN FOR COMPLETE SPECIFICATIONS

3742

Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

SPECIFICATIONS ON ICE STATION

ALL AIRCRAFT ALUMINUM CONSTRUCTION: Outside structure, .051 aluminum; dead air space; .032 Aircraft aluminum; permanently secured Fibre glass insulation; inside structure, .051 Aircraft aluminum. Vapor sealed throughout.

REFRIGERATOR DOOR: .051 Aircraft aluminum construction well insulated with batts of Fibre glass.

REFRIGERATION: 1½ H. P. condensing unit with banks of vacuum cold plate evaporators (more effective than coils). Guaranteed to maintain below freezing temperature with outside temperatures of 100°.

COIN MECHANISM: Lever operated, positive delivery, rejects slugs; also returns money when machine is empty.

PAT. PENDING

FRIGID-VEND AIRCRAFT ALUMINUM ICE STATION

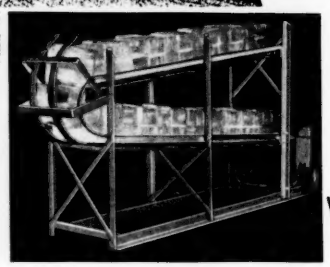
FIREPROOF

Vends Blocked Cubed and Sized Ice

The Frigid-Vend Ice Station is in a class by itself because of its all Aircraft aluminum construction. Lighter in weight, it comes to you already assembled and mounted on skids ready to slide onto foundation.

Vending mechanism is positive and fool-proof. Vending lever is clutch operated, preventing breakage of handle and damage to mechanism. A customer, after insertion of money, can receive only one unit of ice at a time. Jackpot operation is impossible. Coin mechanism rejects slugs and returns money when machine is empty. In appearance, and in profitable operation, a complete Frigid-Vend Ice Station is all you could ask for.

The Station will vend four kinds of ice, two sizes of blocked ice as well as cubes or crushed ice in bags or packages. Or if you prefer you can vend any smaller combination of these four types.



GRAVITY ACTION DOUBLE DECK ICE BLOCK VENDORS

All steel construction with stainless steel covered tracks. ½ H. P. motor with gear head operates tripper bars during vending operation.

Capacity: 25 lb. ice blocks model—27 or 54 blocks
50 lb. ice blocks model—19 or 38 blocks

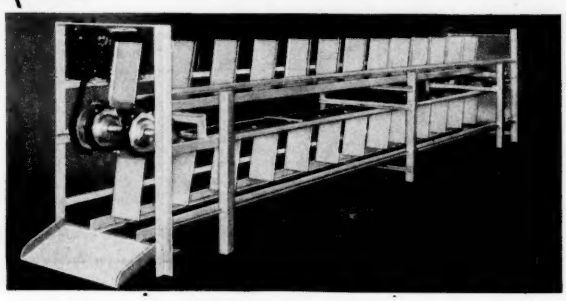
FRIGID-VEND BAG, PACKAGE AND ICE BLOCK VENDORS CAN BE PURCHASED SEPARATELY FOR INSTALLATION IN ANY ICE STORAGE ROOM.

Before You Buy, Get All the Facts. Write for information.
Prompt delivery on all Frigid-Vend Equipment.

THERMO CUBER

THERMO CUBER CO., INC. 2120-2124 N. SOUTHPORT AVE., CHICAGO 14, ILL.

The NEW Frigid-Vend For Bagged Ice ➡

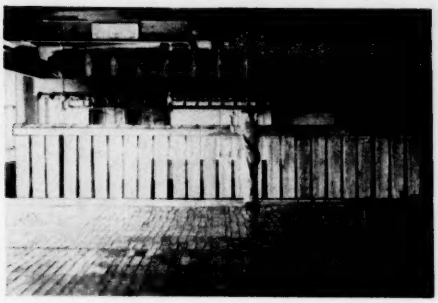


All steel construction. Double chain driven with ½ H.P. motor with gear head. Two and four deck models.

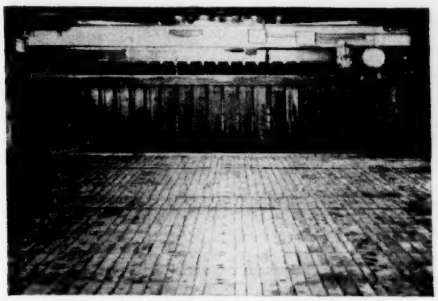
Capacity: TWO DECK VENDOR
25 to 36 bags or cartons depending on size of package.

Capacity: FOUR DECK VENDOR
54 to 78 bags or cartons depending on size of package.

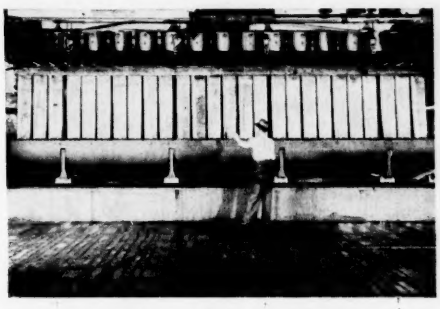
Right: The One-Man One-Shift System of the Polar Ice and Fuel Co., at Indianapolis, Makes 42 Tons Daily



Polar Ice & Fuel Company's 70-Ton System at New Albany



62-Ton Plant of Serv-ice and Coal Company at Columbus



46-Ton 1-Man Plant of Muncie Ice & Coal Company

SIX 1-MAN ICE PLANTS NOW OPERATING IN INDIANA

The world's first large ice-making system to be operated by one man, working only one shift, was started at Indianapolis in February, 1945. This (shown above) has made 42 tons of ice every day for over 1440 consecutive days—a record, and equal to over a billion ice cubes!

Five other Frick 1-man plants have since been built, at Muncie, New Albany, Columbus, Indianapolis, and South Bend. The largest of these makes 108 tons daily. All operate with remarkable economy. A 100-ton 1-man Frick plant is also under construction at El Paso, Texas.

If you need ice-making equipment, get estimates from the largest builder: write, phone or visit your nearest Frick office:

FRICK BRANCH OFFICES

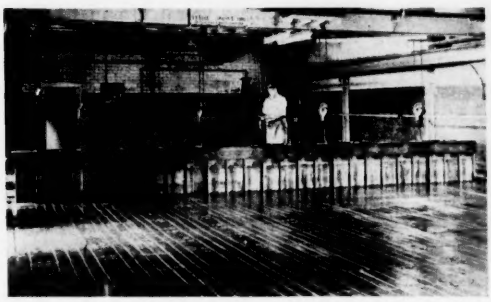
Atlanta 3, Ga.	New Orleans 12, La.
Boston 20, Mass.	New York City 17
Charlotte 2, N. C.	Oklahoma City 3, Okla.
Cincinnati 2, Ohio	Palatka, Florida
Dallas 1, Texas	Philadelphia 7, Penna.
Kansas City 6, Mo.	Pittsburgh 22, Penna.
Los Angeles 14, Calif.	Saint Louis 2, Mo.
Memphis 3, Tenn.	Washington 5, D. C.

DEPENDABLE REFRIGERATION SINCE 1882

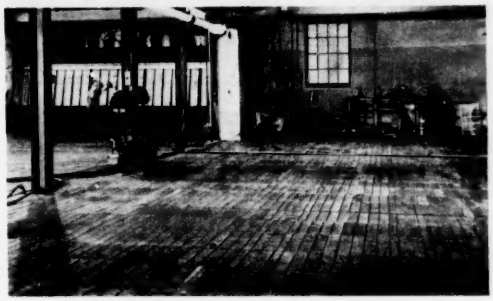
FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery



52-Ton "Zero" Plant, Indiana Ice & Fuel Company, Indianapolis



South Bend Brewing Company's 108-Ton Tanks

SMALL PLANTS

are among our best customers

With the largest and most completely equipped organization in the well water developing field, Layne has always provided excellent service for even the smallest plants. In no case have they had to pay a penalty for Layne's world-wide experience and outstanding success. As a matter of fact, Layne Well Water Systems actually cost less when the advantages of unquestionable high quality, proven efficiency and extra long life are considered.

Small plants receive the same professional engineering, skillful workmanship and high quality equipment as is always provided for the largest industries. The only difference is in the size and capacity of the units installed. Several thousand small plants already have their own Layne Well Water Systems. All are highly pleased with their sound investments; the economy of operation cost and the complete dependability of the units at all times.

Small plants of all kinds;--mills, factories, theaters, food processors, packers, railroads, ice plants etc. are invited to make inquiries and to obtain catalogs about Layne's complete service which includes surveys, water strata explorations, well drilling, pump installations etc. for a complete, thoroughly tested and in operation well water systems. No obligation. Address LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

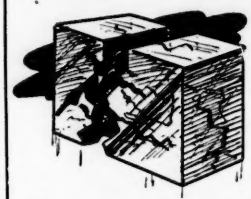
LAYNE

WELL WATER SYSTEMS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio. * Layne-Pacific, Inc., Seattle, Washington * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Minnesota Co., Minneapolis, Minnesota * International Water Corporation, Pittsburgh, Pa. * International Water Supply, Ltd., London, Ontario, Canada * Layne-Hispano Americana, S. A., Mexico, D. F.

Temper Raw Water Ice the B-P way

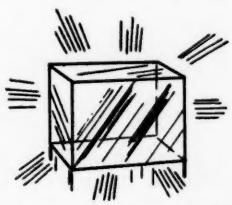
TEMPLETS reduce the tendency of ice to crack and shatter. Water freezes faster with lower brine tank temperatures. Thus more ice can be produced in the same number of cans to meet the large demands of the summer season.



Breakage, checking and cracking may reduce your profit per ton on raw water ice. Improve your ice and increase profits with the use of TEMPLETS.

TEMPLETS dissolve quickly in the can water and go into action immediately to prevent the development of strain which produces brittle ice that is so difficult to handle. TEMPLETS temper the ice and give it strength against bothersome bad breaks during scoring and cutting operations.

Two or more Templets in each can will produce that pleasing appearance and polish to your ice. Treatment by the B-P method costs less than loss through breakage.



Users want clear ice with a clean attractive sparkle and polish. TEMPLETS aid you in eliminating the cloudy veil, white butts and heavy cores which impair clarity of the ice block and any sized ice made from it, all of which means more profit for you at a cost of about 1c per ton of ice produced.

TEMPLETS are being used in Ice Plants throughout the United States and in many Foreign Countries.

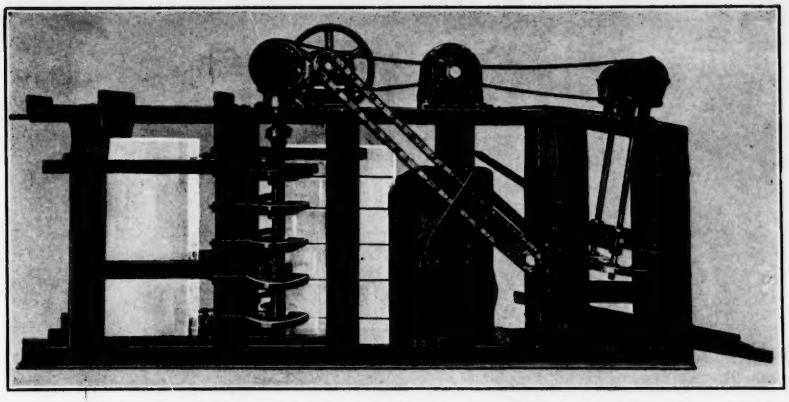
Write today for details and a trial sample.
Your customers will thank you.

BARADA & PAGE, Inc.

GUINOTTE and MICHIGAN AVES.

Kansas City 1 **Missouri**

Equipment Prices ARE NOT HIGH



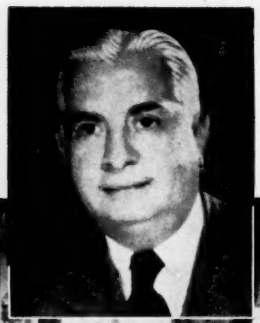
True, some items of equipment used in operation of ice plants . . . trucks for instance, may be priced today at two or three times pre-war costs, but not so with most machinery. Take Perfection Ice Scoring Machines for example. The price for a Perfection Regular Scoring Machine for 300 lb. ice is $2280 F.O.B. factory, today. Ten years ago it was $1750, just 30% less than now. This increase is more than accounted for in labor. Furthermore, today's machine incorporates many improvements.

In actual value, present day Perfections are no higher in cost than they were 10 years ago. In fact they are lower, because they will score more ice, longer.

A model to fit every plant. QUICK DELIVERIES.

Perfection
ICE SCORING MACHINE COMPANY

Phone 3-1258
P.O. Box 2140
FORT WORTH, TEXAS



"We Insist on Packaged Processed Ice to Prevent Contamination"

SAYS E.T. LEMONIS, MANAGER, MOHICAN HOTEL, NEW LONDON, CONN.

The Mohican Hotel (New London, Conn.) is a focal point for local people as well as transients, and widely patronized for banquets and special parties.

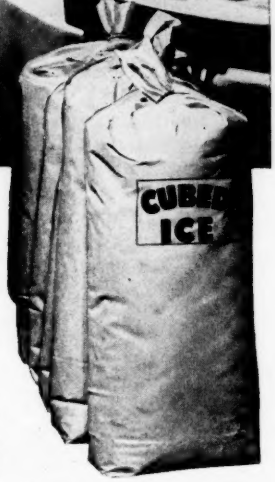
It's Easy to Get New Business With the One-Trip Paper Ice Bags

SANITATION is the first consideration of all who sell food. It's so important that many hotels, restaurants and stores prefer to invest in expensive ice-processing equipment rather than take a chance with old-fashioned returnable open-top containers.

Here's an idea to win new customers and hold old ones! Deliver processed ice in Union One-Trip Paper Ice Bags that bar all chance of dirt and contamination.

You sell more ice in one-trip paper bags, too, for consumers do their own icing and always use more. You speed up handling on the platform, in loading and at the delivery point! And the sturdy wet-strength paper—two layers thick—retards melting.

More ice companies every month are building more business with Union Paper Ice Bags. Join the parade. Write for free samples.



Wet-Strength Paper Ice Bags have tremendous strength even when soaking wet...thanks to a water repellent resin that binds the fibres of the paper firmly together.

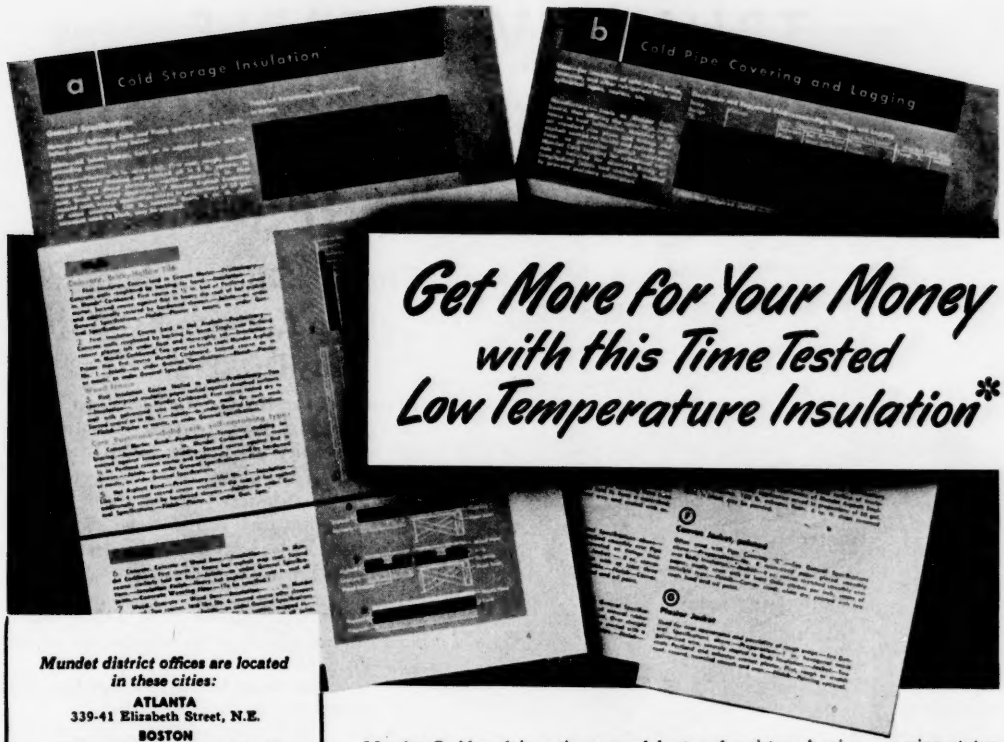
ONE TRIP

TRADE MARK UNION

UNION Paper Ice Bags

A product of the UNION BAG & PAPER CORPORATION • Woolworth Bldg., New York 7, N. Y.

Bags of Kraft, Transparent Films, Waxed Paper, Glassine, Laminates



Get More for Your Money with this Time Tested Low Temperature Insulation*

Mundet Corkboard is a time-proved heat and moisture barrier . . . serving at top-efficiency in hundreds of quick freezing and frozen food locker plants, in cold storage rooms and food processing plants. Whether you have small or large facilities for low temperature, you need Mundet Corkboard for these dollar-saving advantages:

LOW CONDUCTIVITY Mundet Corkboard provides the most efficient barrier to heat transfer due to its internal cellular structure of sealed dead-air spaces.

STRUCTURAL STABILITY The cellular structure of Mundet Corkboard maintains its shape and characteristics under rigorous conditions of service.

NON-ABSORBENCE Mundet Corkboard has no capillary attraction. This nature-made quality avoids absorption of dampness and odors. There is no swelling or loss of insulating value from moisture infiltration.

EASE OF INSTALLATION Mundet Corkboard is light in weight despite its strength. It cuts easily, readily holds nails or skewers; bonds with cement, asphalt or paint.

LONG-LIFE There is only one way to figure insulation cost. That is the over-all 'life-expectancy' of the material. Here, again, Corkboard is the choice, with thousands of installations to prove its durable service.

The best insulation requires competent installation. You benefit from the experienced erecting services that are offered by Mundet branch offices. Corkboard is available for prompt shipment from nearby warehouses. Send coupon for copy of Mundet Cork Manual. Prepared in convenient filing size, with cork specification data.

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BOSTON
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CHARLOTTE, N. C.
206 E. Stonewall St.
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427 West 4th Street
DALLAS 10
601 Second Ave.
DETROIT 21
14401 Prairie Street
HOUSTON 1
Commerce and Palmer Streets
INDIANAPOLIS
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JACKSONVILLE 6, FLA.
800 E. Bay St.
KANSAS CITY 7, MO.
1428 St. Louis Avenue
LOS ANGELES
(Maywood)
6116 Walker Avenue
NEW ORLEANS 16
315-25 N. Front Street
PHILADELPHIA 39
856 N. 48th Street
ST. LOUIS 4
2415 South Third Street
SAN FRANCISCO 7
440 Brannan Street
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Mundet Cork & Insulation, Ltd.
35 Booth Avenue, Toronto

Write us for name of our nearest representative if there is no Mundet office in your city.

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MUNDET CORK CORPORATION
Insulation Division
7101 Tonnelle Ave., North Bergen, N. J.

* *Please send copy of Mundet Cork Insulation Catalog in handy reference size.*

Name.....

Company.....

Address.....

City.....*Zone*.....*State*.....

TRUSTY VEGETABLE
ARCTIC-ICER
DISPLAY CASES

Series
1800 Standard
Model — Base now recessed

The CHOICE of hundreds of Ice Companies in the MIDDLE-WEST

Standard model Arctic-Icers are made in 3, 6, and 8 foot lengths. Constructed of Auto-body steel, all welded joints. Galvanized or stainless steel tank—heavily insulated. Concealed Fluorescent light and mirrors set to show display. Exterior finished in Baked Du Pont Dulux.

OPTIONAL DESIGNS AND EQUIPMENT

- ★ Without canopy for window or island display.
- ★ Enclosed front bottom section, bag and paper rack, or as illustrated.
- ★ Six inch Plexiglass cold air retainer around top.

TRUSTY POULTRY & FISH CASES ARE NOW AVAILABLE
Write for photo and information

Build ICE TONNAGE the ARCTIC-ICER way!

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Economy Model

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Refrigerated Ice Vending Stations

ALUMINUM OR STEEL EXTERIORS

Completely Assembled ..Ready to PLUG IN!

S & S Sturdy-Built *refrigerated* Ice Vending Stations are completely assembled and tested before they leave the factories. Ready to plug in on arrival the complete units are shipped from our Des Moines, Iowa, and San Jose, California, plants via rail, truck or water to save you freight.

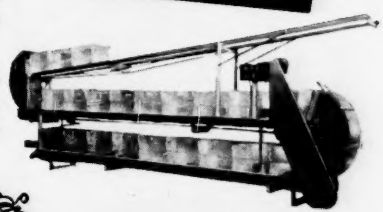
Exclusive S&S STURDY-BUILT FEATURES

- Stations are equipped with heavy duty coin mechanisms that are time tested and are trouble free.
- Stations are equipped with time clocks that turn lights on and off automatically at proper times.
- Vending machines are rust-proofed by metallizing process which completely coats units with zinc to halt corrosion.
- Vending machines are equipped with counters to check unit sales with money deposited.
- Vending machines are completely assembled . . . ready to install in your own refrigerated store-room.

DEPENDABLE S&S Sturdy-Built ice vending stations properly located in your marketing area will increase your retail sales volume . . . and lower your distribution costs. By making ice readily available 24 hours a day, these automatic ice merchandisers tap the rich market of occasional ice users in addition to your regular customers . . . to step up YOUR profits.

Seventeen years of service to the ice industry devoted exclusively to the design and manufacture of dependable automatic ice vending equipment stands behind every **S&S Sturdy-Built** unit. Its efficient, trouble-free operation, and low cost establishes it as the leader in the field.

Cash in on the profitable retail ice market **automatically** with **S&S Sturdy-Built** Ice Vending Stations. Capture those profitable "after hour" sales with "time-tested" equipment.



For detailed information, write Dept. 1

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Highland Park Station
Des Moines, Iowa

S&S ICE VENDING MACHINES

S & S VENDING MACHINE CO.
670 Lincoln Avenue
San Jose, California

ICE VENDING MACHINES

. . . for your own refrigerated store-room are available for as little as $500.75. Completely assembled and all ready to plug in on arrival, S & S Sturdy Built venders will handle 25 or 50 lb. blocks. Other models are available to vend *cubes or processed ice* in bags weighing from 5 to 25 lbs.

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BRINE
MEDIUM

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SOLVAY SALES DIVISION
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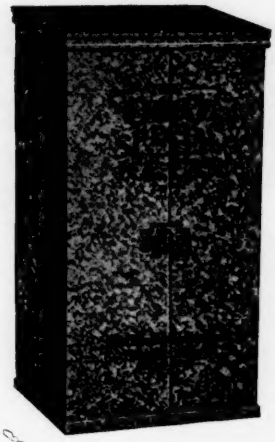

Double Riveted - Welded
Integral Tube Cans
Can Baskets
Condenser Trough

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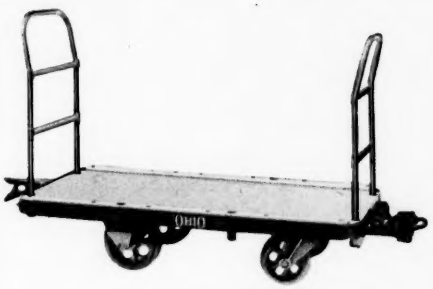


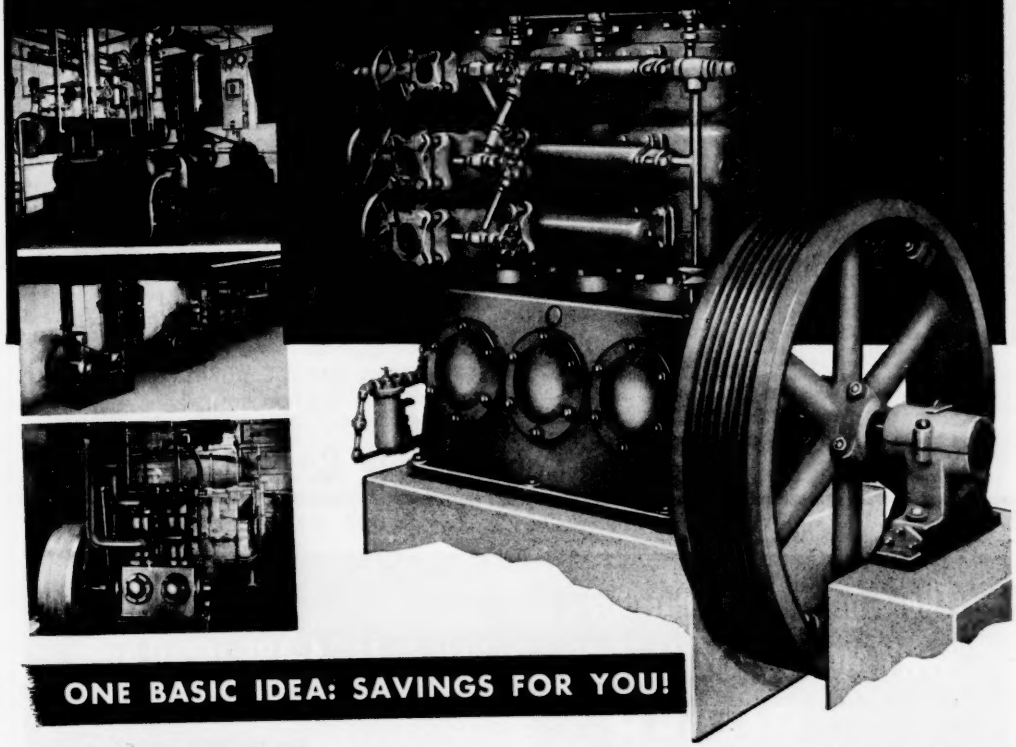
TWO TON CAPACITY
OHIO AUTOMATIC COUPLERS
SIZE 36" WIDE X 72" LONG X 14" HIGH

Write for Catalogue

THE OHIO GALVANIZING & MFG. CO.
NILES *Established 1902* OHIO

HERE'S HOWE

TO CUT REFRIGERATION COSTS TO THE BONE



ONE BASIC IDEA: SAVINGS FOR YOU!

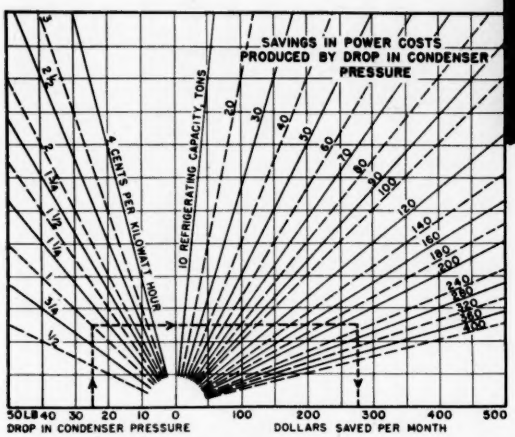
POLAR CIRCLE COILS
Save in first cost. Save space.
Save labor. Save refrigerant.
Save power. Save freight.

For your utmost economy, Howe machinery is scientifically designed to insure, day in and day out, *exact temperature and humidity control.* Moreover, out of 37 years of specialization Howe can design or redesign your entire refrigeration layout to provide the *maximum in efficient, low-cost operation.* The world over, Howe's exclusive job-proved advantages are cutting refrigeration costs. Remember, temperature control is product quality control! Consult Howe engineers about your problems!

SINCE 1912 *builders exclusively of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!*

AVAILABLE
A few choice territories for new distributors. Your inquiry will receive our prompt answer.

HOWE


SAVINGS IN POWER COSTS
PRODUCED BY DROP IN CONDENSER
PRESSURE
4 CENTS PER KILOWATT HOUR
10 REFRIGERATING CAPACITY TONS
50 LB 40 30 20 10 0
DROP IN CONDENSER PRESSURE
100 200 300 400 500
DOLLARS SAVED PER MONTH

This Chart Tells the Story*

FOR EXAMPLE: If you have a 220 ton refrigerating system, a power cost of 1¢ per kilowatt and your condenser pressure is 25 lbs. above normal (a very common condition) non-condensable gases are costing you approximately $275 per month — money that is totally wasted. An Armstrong Purger will eliminate this loss.

**Chart prepared by R. C. Doremus, Detroit Ice Machine Co.*

A Simple Way to Reduce REFRIGERATION COSTS *and Increase Capacity*

AIR and other non-condensable gases in a refrigerating system raise head pressure, make the compressor work harder and longer, reduce condenser capacity and thereby raise power costs. Ordinary purging methods seldom, if ever, get rid of all the air; they waste refrigerant and they take a lot of valuable time.

The answer is to install an ARMSTRONG PURGER. It gets all the air out of the system *with minimum refrigerant waste.* Hundreds of users state that their Armstrong Purgers have paid for themselves in from 30 days to six months. The forged steel body and stainless steel mechanism provide safety and dependability. The price is modest. The Purger is *unconditionally guaranteed* to give satisfaction.

SEND FOR BULLETIN

HOW TO TELL when non-condensables are present; their effect on efficiency and economy; how the Armstrong Purger operates; prices and data are contained in the Armstrong Purger Bulletin. Send for your copy.

ARMSTRONG MACHINE WORKS
860 Maple St., Three Rivers, Mich.

ARMSTRONG Non-Condensable Gas PURGER

There must be a reason . . . . WHY MORE FROZEN FOOD LOCKER PLANTS ARE INSULATED with PALCO INSULATION WOOL

Among the thousands of modern plants using PALCO WOOL INSULATION is McCranie's Frozen Foods Storage and Sales Market at Ocilla, Ga. 300,000 lbs. of produce is processed annually. Facilities include 540 curing bins, 809 lockers.

Over 25% of the locker operators in the U. S. and Canada use PALCO WOOL INSULATION in preference to all other materials! These facts make the reason clear: PALCO WOOL is one of the most efficient insulation materials known, with a thermal efficiency of .255 BTU. Thus constant low temperatures can be maintained at minimum operating cost for greater year 'round profits. PALCO WOOL is permanent, non-settling, moisture resistant, odor-proof, resistant to fire, vermin, fungus growths or decay. And, PALCO WOOL actually costs less to install than most other permanent insulation! Write today for your copy of the PALCO WOOL Plan and Construction Manual for Locker Plants.

FLAMEPROOF INSULATION FROM DURABLE REDWOOD BARK

THE PACIFIC LUMBER COMPANY
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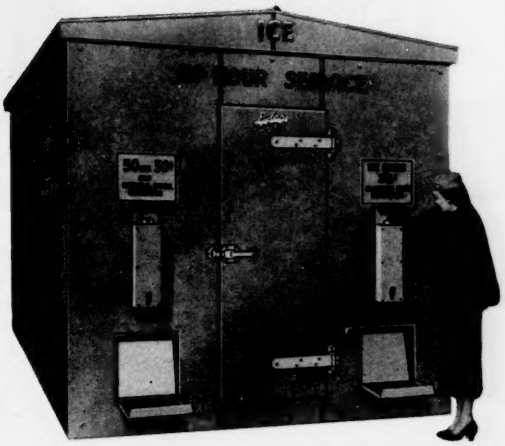
POLAR *ICE VENDING STATIONS*

Setting The Pace...
Leading The Field!

1st. **Aircraft Aluminum Construction**

with **Coin Mechanism That Adds Change**



Look First to Polar for Revolutionary Improvements in Methods of Merchandising Ice

Think First of Polar When Ordering Your Vending Equipment

Check the Complete Polar Line — NOW!

THERE'S Extra Value IN POLAR EQUIPMENT

LIGHT WEIGHT CONSTRUCTION! The aircraft aluminum used in POLAR Stations is heavy gauge for durability, yet extremely light in weight. The sectional stations can easily be transported to the desired location on an ordinary truck. NO CITY PERMIT REQUIRED.

The ease with which the light weight sections can be handled makes it possible for 3 men to completely erect the largest size POLAR station in less than five hours!

We can supply POLAR stations completely set up on skids. However, POLAR STATIONS, SHIPPED KNOCKED DOWN, ARE EASIER TO HANDLE, SAVE ON FREIGHT COSTS, AND LESSEN POSSIBILITY OF DAMAGE IN SHIPMENT. On orders for $5,000.00 or more, our engineer assists with installation.

ECONOMICAL OPERATION! POLAR ALUMINUM ICE STATIONS ARE HEAVILY INSULATED AND EQUIPPED WITH SURPLUS POWER REFRIGERATION UNITS. They will always maintain proper temperatures at the lowest possible cost. Aluminum repels 97% of radiant heat.

LOW UPKEEP! ATTRACTIVE APPEARANCE! There is no maintenance cost involved with POLAR stations for the aluminum does not require paint. The stations are trimmed with chrome, coin boxes are stainless steel, and the hardware and ice chutes are cadmium plated. The attractive appearance of POLAR aluminum stations permanently improves any location where they are installed!

Polar Equipment Helps You SELL MORE ICE -*Automatically!*

Write Today for Free Polar Catalog

REFRIGERATION ENGINEERING COMPANY

211 Foshay Tower *"Pioneers in Refrigeration"* **Minneapolis 2, Minn.**

This plant gives maintenance a cold reception with

BYERS WROUGHT IRON PIPE

Eight to ten million pounds of food, drawn from growing areas from Virginia to Florida, will flow through the Skyland Processing Corporation plant at Henderson, N.C., this year. The two-story, 220 x 222-foot building has 120,000 cubic feet of cold storage area, 100,000 cubic feet of apple storage, and 400,000 cubic feet of processing area, where asparagus, broccoli, strawberries, green beans, peaches, apples, cauliflower, and brussel sprouts are quick-frozen.

The responsibility resting on the 186-ton capacity refrigeration system is obvious; operations must be continuous, and there is no leeway for shut-downs. With the aim of assuring maximum durability and dependability, Byers Wrought Iron pipe was extensively used by the contractor, Burge Ice Machine Company. Illustrations show applications in the compressor piping, and in the cooling coils.

The soundness of these specifications is confirmed by the record, for wrought iron has made history in similar applications. One concern rebuilt its plant, and found the 22 year old wrought iron direct expansion coils in such good condition that the pipe was re-used. Nineteen years later (after 41 years of total service) inspection showed the pipe still in excellent condition. Another concern reported its 45 year old wrought iron coils still serving. These are only two examples out of many.

The unusual service qualities of Byers Wrought Iron pipe come from the unique character of the material. Tiny fibers of glass-like silicate slag, threaded through the high-purity iron, halt and diffuse corrosive attack. The fibers also anchor the initial protective scale, which shields the underlying metal.

If you have any cooling installations in mind, ask for "WROUGHT IRON IN REFRIGERATION AND AIR CONDITIONING SYSTEMS." It will give you the full story.

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, Salt Lake City, Seattle, San Francisco. Export Division: New York, N. Y.

CORROSION COSTS YOU MORE THAN WROUGHT IRON

J. F. NICKERSON, Founder

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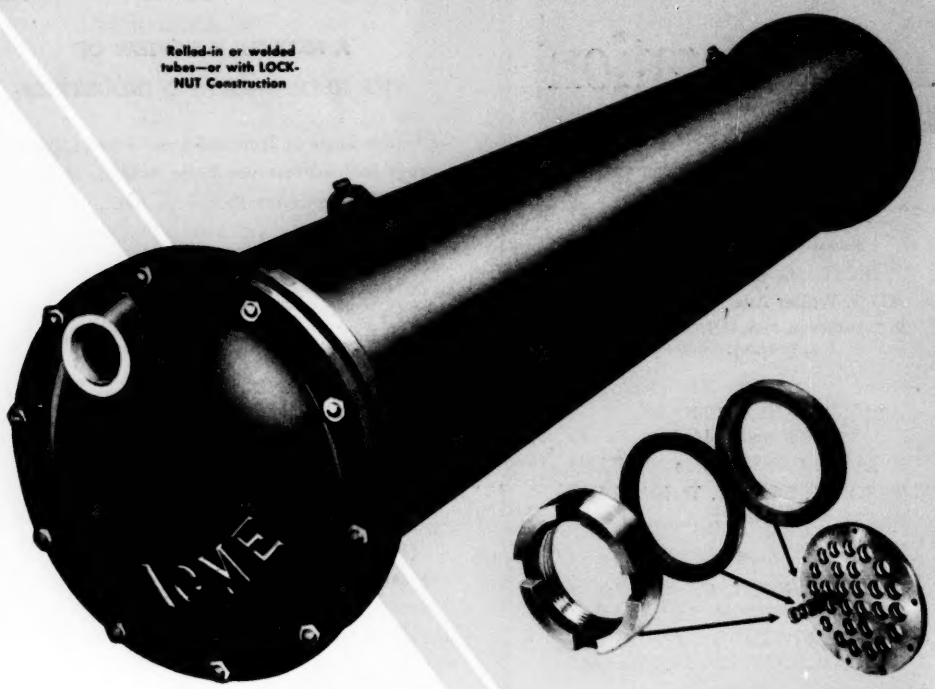
Pipe Coils • Direct Expansion Water Coolers • Shell and Tube Condensers • Industrial Unit Coolers • Oil Separators • Liquid Receivers

Rolled-in or welded tubes—or with LOCK-NUT Construction



LOCK-NUT CONSTRUCTION
Acme's exclusive Lock-Nut Construction of ammonia condensers makes it easy to replace tubes in the field. No special tools are required to replace; merely remove the gaskets, pull out the pipe tube and put in the new one. Write for descriptive folder.

Acme

AMMONIA CONDENSERS

Acme ammonia condensers are "TAILOR-MADE" to operate with available water temperatures and volumes. A full range of models, types and sizes (capacities from two-tons to 200-tons) permits exact specifications to fit practically every application or condition. Acme ammonia condensers comply with ASME Code U-69 and provide low-cost and lasting performance. For original equipment or replacement specify Acme. It's easy to select the right model from Acme Catalog 21-B. Write for yours today.

ACME PRODUCTS

ACME INDUSTRIES, INC.
JACKSON, MICHIGAN
Representatives in Principal Cities

CONTINUOUSLY SERVING THE REFRIGERATION INDUSTRY SINCE 1919

IN THIS ISSUE —

Ice Prices for 1949

The annual report on ice prices for 1949 established in the more important ice-producing centers, an annual feature of ICE AND REFRIGERTION for many years, starts on page 27. Prices will be a trifle higher than those for 1948 and generally higher than for any previous year. The grand average of all ice prices is $8.73 per ton as compared to $8.55 per ton in 1948. Prices are shown from 288 distributors located in 47 states, the District of Columbia and Canada, on domestic, commercial and wholesale ice.

Corrosion Tests of Iron and Steel Pipes

To determine relative corrosion resistance of commercial piping to cold flowing water, the National Bureau of Standards has made a number of tests extending over a ten year period. Studies of the data indicate that the more expensive pipes offer no appreciable advantage in this respect over the usual cast-iron water pipe. These and other conclusions are included in a summary published on page 23.

National Ice Merchandising Forum

A plan that has been in the making for several months to encourage more active merchandising of ice and ice-using appliances, has resulted in formation of an organization to function within the Unit ice associations. Regular meetings of all merchandisers will be held. For details see page 35.

Ice is Best for Fresh Produce

A wholesale food organization of Minneapolis recently conducted tests which show conclusively that iced produce is the way to sell fresh fruits and vegetables. The results of these tests present a golden opportunity to ice men as pointed out in the article on page 37.

Orange Juice Concentrate

The most important frozen food product on the market from the standpoint of consumer acceptance is orange juice concentrate, orange juice processed under low temperature. In the June 1948 issue the manufacturing process was described and now, on page 65, is an article on the merchandising angle.

Accident Prevention

The other fellow appears to drive recklessly and be careless in many ways but injuries don't always happen to him. Too frequently they happen to us. It is somewhat the same in industry. We are inclined to look at other industries and imagine they are hazardous and have many accidents. Our guess may be quite wrong because a good safety program is keeping such troubles in check. On page 45, D. A. Laird tells how one of the large dairy companies is meeting the accident problem with an effective, well integrated program.

Safety in Refrigerated Warehouses

The frequency rate for lost time injuries in the refrigerated warehousing industry for 1947 was 98.83 as compared to 13.26 for all industries. The severity rate was 2.81 compared to 1.23 for all industries. These are startling facts, but they are verified in the report of the Safety Committee presented at the 58th annual convention. See report on page 55.

Cold Storage Holdings

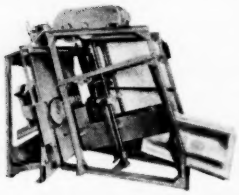
Cold Storage occupancy declined again during February to such an extent that coolers were 17 points below the five-year average and freezers were 13 points below average. However this level appears to conform to that reported in pre-war. These and other facts are reported and analyzed in the monthly report published on page 57. A summary of holdings for the year 1948, on page 59, shows below average occupancy.

Air Purification in Refrigerated Storage Rooms

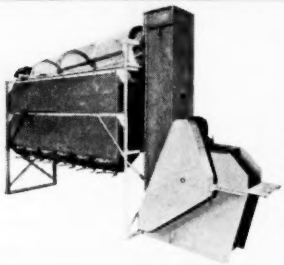
For some time refrigerated warehousemen have been interested in the effects of oxygen and carbon dioxide on stored fruits. This has led to a study of overall air purification dealing not only with those two important gases but also with odors and other gases. The subject is reviewed, with data on present knowledge and some conclusions in the article on page 61.

Palletized Operations in One Story Warehouse

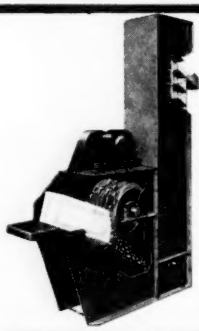
Various types of plant layouts and differences in various basic commodities may dictate different handling problems. There are a number of general principles covering mechanized handling however that apply to warehouses of the same or similar type. The subject is discussed in the article on page 63 from the standpoint of the one-story warehouse.



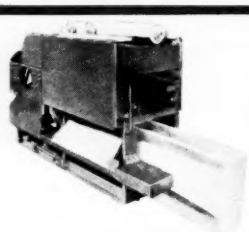
NEW TYPE "CA" CUBING MACHINE—A fast, economical automatic cuber handling cakes of 300 or 400 lbs., at a capacity of 25,000 cubes per hour. Sturdy, simple construction guarantees high output of clean cut cubes, minimum waste, trouble-free operation, low maintenance. Write for Bulletin No. 488.



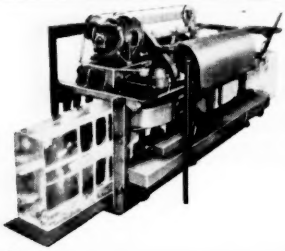
SERIES S-16 ICE SIZING UNIT—Combines Breaker-Elevator Unit S-16E and the new G-W 620 Precision Breaker with screen and bagging bin assembly. Four types meet varied requirements in elevator heights and bin capacities, assuring full production capacity and bagging output. Write for Bulletin No. 482.



NEW BREAKER-ELEVATOR—Corrosion-proofed throughout with stainless steel or aluminum alloy. Curved picks anchored in metalized, rustless drum, eliminate snow ice and fines. Ribbed drum bypasses particles through comb plate without crushing. Closely-spaced, continuous elevator flights reduce drop and breakage. One motor drives both breaker and elevator. Write for Bulletin No. 482.



NEW TYPE "G" SCORER — The latest development for fully automatic scoring in a medium-priced unit. Has the ruggedness of G-W's Type "F" Scorer, and the precision of the fully automatic Type "UM". Scores up to five 300-400 lb. cakes per minute. Streamlined, compact, safe. Write for Bulletin No. 489.



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Corrosion Tests of Iron and Steel Pipes

TO PROVIDE comprehensive data on the relative corrosion resistance of commercial pipe materials to cold flowing water, continuous-flow laboratory tests[1] extending over a 10-year period have been made on a number of these materials by G. A. Ellinger, L. J. Waldron, and S. B. Marzolf of the National Bureau of Standards. Since replacement of corroded water pipe — often involving the rebuilding of walls and floors through which the pipes run — is almost always expensive, the results of this investigation have provided the building and plumbing industries with useful information. Studies of the data indicate that while there were significant differences in the corrosion of some of the materials, the more expensive pipes offer no appreciable advantage in this respect over the usual cast-iron water pipe.

In the Bureau's investigation, tap water of known analysis was circulated at constant velocity through a system of eight vertical columns, each made up of 14 specimens of pipe lengths. The specimens (Table I) consisted of two types of cast iron, three of wrought iron, two of ingot iron, and three of open-hearth steel. Individual specimens were removed and replaced with new ones of the same materials at the end of specified periods ranging in length up to 10 years. Corrosion of the exposed pipe, as indicated by loss of weight and depth of pits, was then evaluated in relation to duration of exposure.

To prepare the specimens, 5½-inch lengths were cut from the pipes, and the ends were machined smooth and parallel. In order to remove all surface dirt, grease, and mill scale, the test sections were first washed thoroughly in strong alkali or soap solution. This was followed by treatment with 10 per cent sulfuric acid and an additional washing in clean soap solution. Corrosion of exterior surfaces of the pipes was prevented during the tests by coating with asphalt varnish.

Uniform Exposure Provided

The equipment was designed to permit the continuous uniform exposure of the inner surfaces of all of the specimens to water of known composition and constant velocity. Except for the metal specimens, the water within the apparatus came in contact only with rubber, glass, and stainless steel. Metallic contact and subsequent galvanic action between adjacent specimens was prevented by the use of separating rings of hard rubber. The specimens were fitted securely into recesses machined in the separators, and the entire column was made watertight by means of three equally spaced external tie rods.

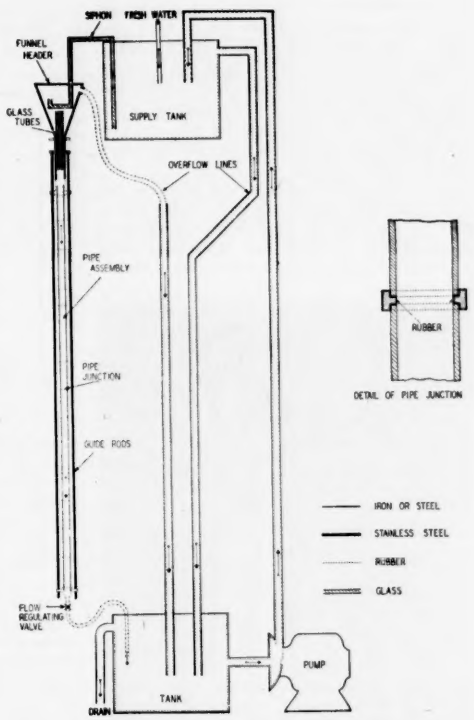


Fig. 1—Schematic diagram of apparatus used by National Bureau of Standards to investigate the relative corrosion resistance of standard water-pipe materials. Cold tap water was continuously circulated at a uniform rate through a system of eight vertical columns, each made up of 14 specimens of pipe material. The columns were supported in a vertical position and maintained in a watertight condition by tie rods, guide and supporting sleeves, and stainless steel holders. Galvanic action between adjacent specimens was avoided by use of hard-rubber separating rings (right inset). Turbulence of the water entering a column through the funnel header was prevented by placing a number of parallel glass rods in the top of each column.

[1] For further details, see Laboratory corrosion tests of iron and steel pipes, by G. A. Ellinger, L. J. Waldron, and S. B. Marzolf, Paper Trade Journal *127* (No. 10), **27** (1948); also 1948 Preprint No. 21, American Society for Testing Materials.

TABLE I.—IDENTIFICATION SYMBOL AND COMPOSITION OF MATERIALS *

Identification Symbol	Material	Composition, percent C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Graphite
A	Wrought iron—aston process	0.02	0.04	0.092	0.025	0.18	0.03				
B	Wrought iron—hand puddled	0.02	0.06	0.16	0.012	0.12	0.04				
C	Cast iron—centrifugal cast	3.61	0.64	0.34	0.088	2.46	0.37		0.33		2.96
D	Cast iron—sand cast	3.57	0.54	0.57	0.071	2.26	0.15		0.09		2.97
E	Open hearth steel	0.18	0.43	0.010	0.017	0.18	0.05				
F	Copper bearing steel	0.11	0.42	0.007	0.022	0.19	0.29				
G	Ingot iron	0.02	0.03	0.005	0.026	0.01	0.05				
H	Cu-Mo ingot iron	0.03	0.14	0.008	0.012	0.01	0.45			0.07	
I	Cu-Cr-P-Si steel	0.08	0.21	0.16	0.016	0.80	0.39		1.10		
J	Nickel-bearing wrought iron	0.02	0.05	0.087	0.012	0.10	0.08	1.72			

* Analyses made by Chemistry Division, National Bureau of Standards.

Care was taken to secure junctions as smooth as possible, since any projection, crevice, or irregularity would interfere with the normal flow of the water and create artificial turbulence and eddies. Turbulence of the water entering the apparatus was prevented by the insertion of a number of parallel glass rods in the top of each column. The columns were supported in a vertical position and maintained in a watertight condition by the tie rods, guide and supporting sleeves, and stainless steel holders. The capacity of the entire apparatus, including the top and bottom tanks and all columns and overflow pipes, was about 70 gallons.

After removal from the test columns, the specimens were dipped in trichlorethylene to dissolve the varnish. Corrosion products were removed by washing and treatment with 10-percent sulfuric acid and dilute caustic soda. The specimens were weighed, and the corrosion losses were calculated in grams per unit of interior surface area. The specimens were then sawed longitudinally, and the depths of the pits on the corroded surfaces were measured.

It was found that corrosion of the interior surfaces of

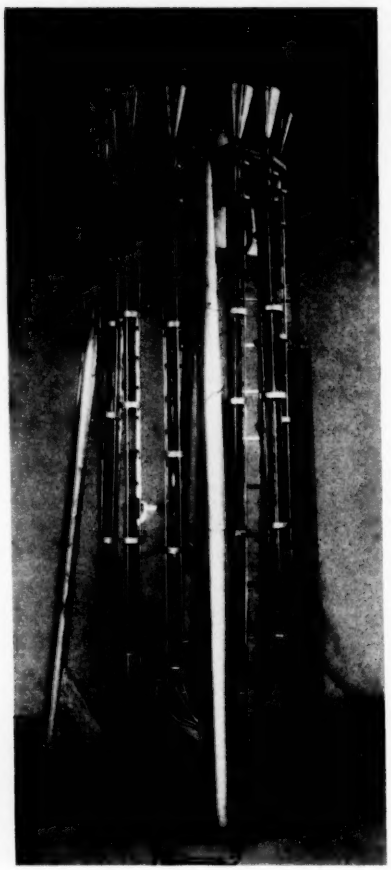


Fig. 2—Apparatus used by the National Bureau of Standards in studies of the corrosion resistance to cold flowing water of commercial pipe materials. Tap water of known analysis was circulated continuously at constant velocity through a system of eight vertical columns, each made up of 14 specimens of pipe lengths. Corrosion of the exposed specimens was evaluated in terms of loss of weight and average depth of pitting.

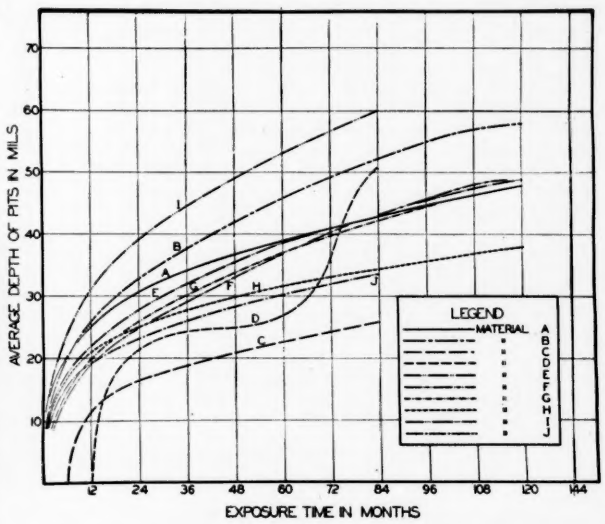


Fig. 3—Average depth of pits plotted against exposure time for 10 types of water-pipe materials investigated in corrosion studies at the National Bureau of Standards. The materials tested are designated by letter to correspond to those listed in Table I. The plotted depth of pit is the average of the six deepest pits for each specimen.

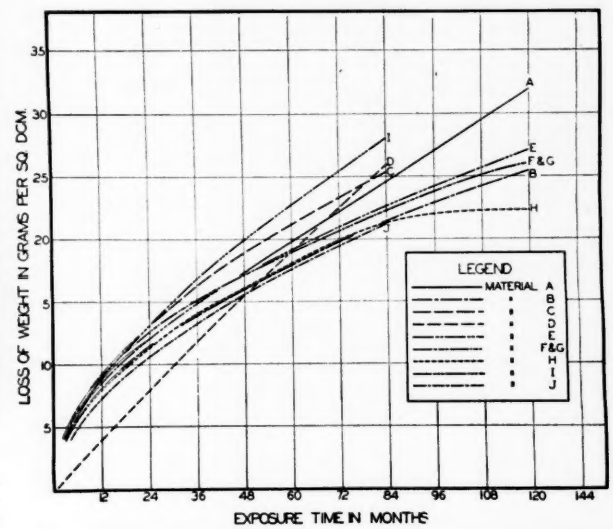


Fig. 4—Graph of data obtained by the National Bureau of Standards in studies of the corrosion resistance of 10 different kinds of pipe materials to cold flowing water. Less of weight per unit surface area is plotted against exposure time. The letter designations of specimen materials correspond to those listed in Table I.

the pipes started with the formation of small localized mounds of rust, the number and size of which increased with time. The rust which formed during the first year or two was lightly adherent and was easily removed. However, as corrosion continued, the rust coating became denser, more tightly adherent, and more difficult to remove as most of the mounds developed into a tubercular form of rust. Many uncorroded areas were found on the surfaces of the specimens during the first several years of testing, but few were found on specimens exposed for more than five years. The pH of the water was such that small amounts of calcium carbonate were deposited with the rust, probably increasing the protective effects of the rust coating.

Definite Trend Established

Although the results show a certain amount of scatter among the individual specimens, a rather definite trend was established early in the test and continued throughout its life. Materials which showed the highest losses of weight or depth of pits in the early stages generally maintained this trend throughout. With respect to loss of weight, the test materials fall into three groups. Materials B, E, F, G, H, and J (Table I) had the lowest corrosion losses; somewhat higher losses were experienced by materials A, D, and C; material I had the highest losses.

The average depths of pits at the end of seven years showed considerably more difference than the average losses of weight. Again the materials tested could be divided into three groups. Materials C, J, and H had the shallowest pits; intermediate pit depths occurred in materials A, E, G, and F; and materials D, B, and I had the deepest pits.

The shallowest pits occurred in the centrifugally cast iron, while the sand-cast iron had pits approximately twice as deep. Since the loss of weight was about the same for both materials, these results indicate that the corrosion of the centrifugally cast iron was general, with little localized deep pitting, whereas that of the sand-cast iron was largely by deep pitting. The condition of the casting skin of these materials was probably largely responsible for the difference in corrosion characteristics.

Failure of any piping material in actual service usually results from perforation of the wall by pitting, with resultant leakage. It might be expected that the depth of the deepest pit would control the time required for a pipe to pit completely through, but no evidence was found to indicate that the deepest pit at any intermediate stage of the test would be necessarily the first to perforate. On the other hand, some evidence was obtained that pitting might be inhibited at times by the deposition of chemical compounds or by the formation of corrosion products in the bottoms of the pits, thus preventing or retarding subsequent attacks.

With the exception of the two cast irons, which had greater wall thicknesses than the wrought materials, the average depths of pits after seven years represented penetrations of from 20 to 40 per cent of the wall thickness, whereas after 10 years the penetrations were from 25 to 26 per cent. If the depths of the deepest pits are used as criteria, the penetration of corrosion into the various materials other than the cast irons ranged between 30 and 70 per cent after seven years of testing. In those tested for ten years, the penetration ranged from 36 to 52 per cent.

Comparison of the average depths of pitting obtained in these tests with those obtained in other tests still under way at the National Bureau of Standards on actual service lines indicates that approximately 50-per cent greater corrosion occurred in the laboratory tests than in the service lines. This is probably due to the continuous flow of the water in the laboratory tests as compared with intermittent flow in the service lines. In the laboratory the corrosion products would tend to be removed more rapidly than in the service lines; thus in the latter the accumulation of corrosion products might be expected to retard the corrosion process to some extent.

The results of the tests indicated that there was no great difference in the rates of corrosion of most of the wrought materials when measured either by loss of eight or by depth of pitting. A low-alloy steel had the highest corrosion rate while a copper-molybdenum ingot iron and a nickel-bearing wrought iron had the lowest rates. Other low-alloy materials such as wrought irons, ingot iron, and ordinary medium carbon steel pipes corroded at intermediate rates. A rough estimate of the minimum life of these materials when subjected to continuous flow of Washington (D. C.) water would be about 15 years on the basis of this work.

New Mechanical Refrigerator Car Tested in Canada

THE first test run of the mechanically-refrigerated railway car designed by the Fisheries Research Board of Canada was successfully completed early in March when the car arrived in Montreal with a load of apples from Kelowna, B. C. The car intended primarily to obtain adequate low temperatures for fish products during transportation over long distances, was designed by fisheries scientists at the Board's Pacific Experimental Station at Vancouver. The cooling unit can be made to act as a heating unit also and this was the first time its heating facilities were tested. Kept at temperatures which did not vary more than 3.4 degrees despite the fact that weather conditions outside ranged from 10 degrees below zero to 43 above zero, the apples were in good condition.

Temperature control inside was obtained by two gasoline-operated thermal units installed at one end of the insulated car. Success of the run demonstrated the usefulness of the car in transportating perishable fruit under extreme cold condition. The car's facilities for maintaining low temperatures for transporting frozen fish and frosted foods have already been tested and found satisfactory during a preliminary trial. However, further test runs with carloads of frozen fish during hot weather are being planned for this summer.

From the Board's point of view, the important results of the recent trial run from Kelowna to Montreal were that the equipment operated satisfactorily during the regular railway freight service and the temperatures inside the car were controlled to between 32 and 36.5 degrees, never varying more than 3.4 degrees in any one part of the car and the difference between the warm and cold spots not exceeding 2.8 degrees after equilibrium was reached.

Safety Rules for Fluorescent Lamps

METHODS of eliminating hazards created by burned out fluorescent lamps were agreed upon by representatives of industry, education and government groups at a conference in Washington called by the department of health and sanitation. Those attending the meeting adopted a list of precautions for disposing of burned out lamps. The list follows:

1—Keep discarded tubes away from children.

2—Never break tubes or place them in incinerators.

3—Deliver tubes directly to refuse collection trucks.

4—Never place tubes in open containers in the street.

5—Should a tube be broken, sweep up the fragments and wrap them in heavy paper.

6—Never handle broken fragments without gloves.

7—If cut by a broken tube, consult a doctor at once.

Storage in Ice Preserves Folic Acid[1]

THE important nutrient, folic acid, in a number of vegetables is well preserved when the vegetables are packed in cracked ice for periods as great as two weeks. There is some loss in storage in a refrigerator at 39-41 F. and at room temperature many of the vegetables lost significant amounts of folic acid in one day.

The information was obtained in an investigation carried on by Fager, Olson, Burris and Elvehjem at University of Wisconsin and published in Food Research, Jan.-Feb., 1949. Under refrigeration and especially when stored in ice, some of the vegetables actually gained in folic acid content for reasons analyzed in the report. Included in the investigation were other studies of folic acid content in some canned vegetables, feedstuffs, breakfast foods and various portions of certain leafy plants.

The following has been extracted from the section on storage of fresh vegetables:

Preliminary studies of the effect of various storage conditions on the folic acid content of vegetables reported by Olson et al, (1947) indicated that losses which occurred at room temperature could be prevented for periods of up to two weeks by storing the vegetables in crushed ice or in the refrigerator. However, in most cases the folic acid content of the vegetables increased during the storage period at low temperature, and it was concluded that the increase was the result of the liberation of folic acid from its conjugate during storage. Results reported here are a continuation of the preliminary work, differing only in the use of hog kidney conjugase instead of takadiastase for liberation of folic acid.

The vegetables were obtained fresh from the garden or greenhouse. They were immediately divided into several groups for storage. To insure that all samples were of equivalent maturity, the vegetables were first divided into several size groups and then the size groups divided equally into several samples for storage. The samples were placed in wax bags and then stored at room temperature, in the refrigerator at 4 to 5 deg. C. (39 to 41 F.), or in crushed ice. The crushed ice was placed in and around the bag and replenished as needed. One sample was prepared. immediately for assay; other samples were prepared for assay as indicated. (See Table).

As in our earlier work, storage of vegetables at room temperature resulted in large losses of folic acid, whereas refrigeration or storage in crushed ice was effective in preventing losses. Storage in the crushed ice was somewhat more effective than refrigeration in this respect, and for the preservation of the fresh appearance of the vegetables crushed ice was much superior to refrigeration. Again, increases in folic acid were found in several instances when the vegetables were stored in the cold.

It has been found, Olson et al (1948B), that rat livers contain a precursor of folic acid which cannot be determined by the method used here. It is possible that a similar substance occurs in plants, which might explain results obtained in the storage studies (especially with lettuce). For instance, if a "bound" form of folic acid not measured by the method used here, is present in plant materials, it may be released slowly by enzymes in the plant tissues at the low temperatures. Its release at higher temperatures (room temperature) may be masked by a rapid destruction of folic acid. Storage in the refrigerator or in crushed ice markedly reduces the rate of destruction of the vitamin, and the apparent release of the "bound" form becomes noticeable. However, experimental proof of the occurrence of such "bound" forms of folic acid in plant materials is still lacking.

Summary

A hog kidney conjugase has been used to liberate bound folic acid in plant materials. The folic acid contents of samples of fresh vegetables, canned vegetables, grains and breakfast cereals are reported. Large variations in the folic acid content of various parts of plants were observed. The destruction of folic acid which occurs when fresh vegetables are stored at room temperature is largely prevented by storage in a refrigerator (4 to 5 C.) or even more completely by storage in crushed ice. Data accumulated indicate that "bound" forms of folic acid other than folic acid conjugate may occur in plant tissues.

EFFECT OF VARIOUS STORAGE METHODS ON THE FOLIC ACID CONTENT OF FRESH VEGETABLES

Vegetable	Micro-organism[1]	Folic acid content of vegetables under various storage conditions (γ/gm., dry basis)							
		Fresh	Room temperature			Refrigerator		Crushed ice	
			1 day	2 days	3 days	1 week	2 weeks	1 week	2 weeks
Parsley	S.F.	12.00	.....	.....	7.00	.....	10.00	.....	14.00
	L.C.	12.00	.....	.....	6.20	.....	8.30	.....	14.00
Green beans	S.F.	5.00	3.10	.....	2.20	2.80	.....	3.40	.....
	L.C.	4.80	2.90	.....	2.50	3.70	.....	4.10	.....
Peas	S.F.	0.97	0.88	.....	0.56	0.89	0.89	1.12	1.08
	L.C.	1.02	0.93	.....	0.51	0.70	1.08	1.12	1.08
Asparagus	S.F.	12.00	9.30	5.60	3.20	8.80	8.40	9.90	14.00
	L.C.	12.00	7.50	5.60	2.60	9.10	7.20	9.60	11.00
Endive	S.F.	6.30	5.20	3.80	1.80	4.90	6.50	6.70	7.60
	L.C.	7.10	6.60	4.90	2.60	4.70	5.80	6.30	6.10
Spinach	S.F.	27.00	20.00	20.00	16.00	20.00	27.00	22.00	31.00
	L.C.	22.00	19.00	17.00	14.00	21.00	18.00	23.00	21.00
Swiss chard	S.F.	7.30	7.40	8.30	6.30	8.40	7.00	9.50	9.70
	L.C.	5.70	6.00	8.00	4.60	6.10	6.40	7.70	10.00
Swiss chard	S.F.	3.90	3.20	2.80	.....	4.80	3.20	5.00	3.50
	L.C.	3.60	3.20	2.20	.....	4.20	3.30	4.30	3.50
Swiss chard	S.F.	10.00	.....	.....	4.80	.....	5.40	.....	12.00
	L.C.	10.00	.....	.....	7.40	.....	6.50	.....	13.00
Leaf lettuce	S.F.	10.00	10.00	9.00	.....	15.00	.....	20.00	.....
	L.C.	9.00	10.00	8.00	.....	12.00	.....	15.00	.....
Leaf lettuce	S.F.	9.00	11.00	9.00	.....	11.00	.....	13.00	.....
	L.C.	9.00	10.00	10.00	.....	10.00	.....	11.00	.....

[1] Microorganism used for microbiological assay: S.F. = *S. faecalis*; L.C = *L. casei*.

1. Folic Acid in Vegetables and Certain Other Plant Materials, E. E. C. Fager, O. E. Olson, R. H. Burris, and C. A. Elvehjem, Department of Biochemistry, College of Agriculture, University of Wisconsin,—Food Research, Jan.-Feb. 1949, pg. 1.

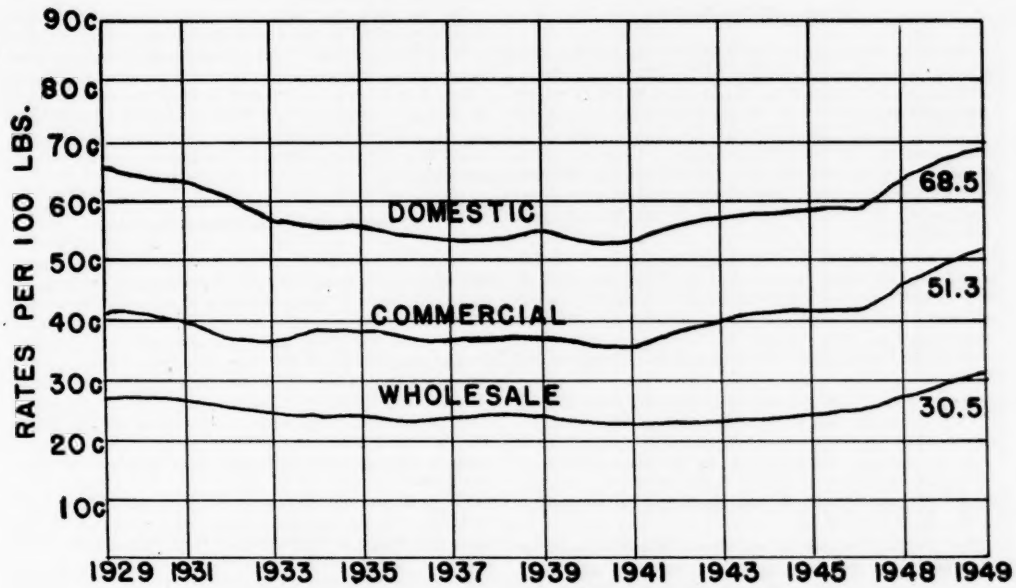
2. This investigation was supported in part by grants from the National Association of Ice Industries and the Wisconsin Ice Association.

Ice Prices for 1949—Upward Trend Over Previous Years Continues

ICE prices for 1949 will be a trifle higher than for 1948 and generally higher than for any previous year according to results of an annual survey made by ICE AND REFRIGERATION. The exceptions, where prices are not higher, as noted in the following summary, include slight sectional decreases in light commercial, carloads, and car icing; also for processed ice, fresh fruit and vegetable icing to growers and shippers. On the other hand markedly increased prices are shown for domestic delivered in all sections, heavy commercial, to dealers, for comfort cooling, ice cubes, fresh fruit and vegetable icing to stores, and re-icing produce trucks.

Chart Shows Twenty Year Trend

A chart showing the trend in average prices for domestic, commercial and wholesale ice over a period of twenty



Trend of average prices for domestic, commercial and wholesale ice 1929-1949

Prices for this survey were obtained from 288 distributors located in 47 states, the District of Columbia and Canada. Figures and other information from each of these distributors are tabulated and analyzed in the tables following.

Prices Summarized

In the tables following, reports are given from representative cities, followed by complete summaries of all the prices listed. Since the chief ice markets in the country, covering both cities and smaller towns, are represented they reflect what may be considered as average prices. These averages are arithmetical and not weighted since it obviously would not be possible to obtain accurate weights on such a large number of classifications representing both large and small markets.

Average prices for the four sections of the country tabulated in Table I show increased average prices over last year for every classification except for light commercial and carloads in the eastern section and light commercial and car icing in the western section. The general average for all sections listed in Tables II and III show a slight decrease for light commercial. Combined prices for both light and heavy commercial however show a slight increase. In all other classifications there is an increase.

years, is shown on this page. It is interesting to note that there have been only slight changes over these years, that the trend toward increased prices started about 1941, and that present prices are only slightly higher than in 1929, twenty years ago.

Scored Ice

The use of ice scoring machinery continues its trend upward. Of the 288 plants reporting, 224 use scored ice equipment as compared to 215 of the 276 plants reporting last year.

Contract Ice

Sales of ice on contract appear to be practically the same, 33 of the 288 plants using this plan as compared to 29 of the 276 plants reporting last year. Most of such contracts are on a yearly basis, serving customers both winter and sum-

mer. Typical year-round rates are $3.75 and $3.50 per month and for both winter and summer, 90 cents a week. Others are based on the amount of ice used, such as $5.00 to $7.00 per ton. One contract offers a graduated monthly scale from $2.00 a month in winter to $4.00 a month in summer. Another concern has had in effect for many years a contract covering twelve consecutive months for a 100 lb. refrigerator at 40 cents per cwt. for the amount used, paid for out of a $10.00 coupon book, bought and paid for in advance.

Comfort Cooling

Sales of ice for comfort cooling show about the same as last year, 26 concerns reporting such sales as compared to 23 last year. The price range in ton lots is considerably higher than last year, from $5.00 to $10.00, with an average of $7.00. Last year the range in ton lots was $4.00 to $5.50 with an average of $4.70.

Sized and Crushed Ice

Again this year figures on sized and crushed ice show a trend toward increased sales. Of the 288 plants, 230 report the sales of crushed ice as compared to 224 of the 276 plants reporting last year. The price range for commercial is from 40 cents to $1.40 per 100 lbs., with an average of 62.8 cents. Only 15 distributors reported a price of $1.00 or more per 100 lbs. and only two the low price of 40 cents. Last year the range was from 23 cents to $1.40 with an average of 63 cents per 100 lbs. In 1947 the average price was 55.8 cents.

The swing toward quoting prices on basis of 100 lbs. noted last year seems to have lost its momentum. In 1948 only eleven quotations on crushed commercial were made on bases other than 100 lbs. while this year 20 quotations were based on tubs, bushels and bags. For bushels the price range is from 25 to 50 cents with an average of 36.3 cents.

For domestic trade, 183 reported sales. The range is from 50 cents to $1.60 with an average price of 79.5 cents per 100 lbs. last year the range was from 35 cents to $2.00 with an average of 82.9 cents. In this classification 23 quotations were an bases other than 100 lbs. For bushels the price range is from 40 cents to $1.00 with an average of 57.2 cents per 100 lbs.

The general tendency to establish a slight increase for sized over block ice continues. A practice that appears to grow in favor each year is to charge 10 cents more for sized ice. An Illinois concern adds 12 cents to block ice prices. A Kentucky concern, however, as well as a number of others, sells crushed ice for the same as block. In an upstate New York city the differential is $2.00 a ton. An Oklahoma concern charges 10 cents more per 100 lbs. for commercial and 5 cents more for domestic. An Indiana concern meets a popular demand from the domestic trade by delivering it in 25 and 50 lb. wet strength paper bags at 50 and 80 cents a bag.

Increased Volume of Processed Ice

A considerable upturn in the volume of sized and crushed ice is revealed in tonnage figures for 1947 and 1948 and estimates for 1949. Although 1949 estimates show a healthy increase over 1948, the upward curve is not quite so pronounced as was the 1948 estimate over 1947. The figures show for 1947 production (114 plants reporting) 199,357 tons, an average of 1748 tons by each plant; for 1948 production (121 plants reporting) 221,737 tons, an average of 1833 tons; estimated 1949 production (122 plants reporting) 231,800 tons, an average of 1,900 tons.

One Georgia concern reports that about 10 per cent of their sales are crushed ice. One of the larger Illinois distributors reports about 15 per cent increase in sized ice sales and about 5 per cent increase in the sale of cubes. An Indiana company says about 25 per cent of their tonnage is in the form of sized ice.

Ice Cubes

The sale of ice cubes apparently continues on about an even keel; 103 reporting such sales for commercial use as compared to the same number last year. The range in price per 100 lbs. is from 50 cents to $2.00 with an average of $1.26 as compared to 30 cents to $2.00 with an average of $1.10 last year.

A popular method of selling cubes is by the bushel, 34 concerns providing such quotations for the commercial trade, with a range of 50 cents to $1.60 and an average of 82.8 cents as compared to last year's range of 50 cents to $1.00 and an average of 84 cents.

For the domestic trade, 84 concerns reported such sales with a range of 50 cents to $3.60 and an average of $1.53 per 100 lbs. Last year it was 40 cents to $3.00 with an average of $1.41. Quotations per bushel were made by 24 concerns, with a range of 70 cents to $1.50 and an average of $1.06. Last year it was from 70 cents to $1.50 with an average of $1.04. One Oklahoma concern reports an active demand this year for cartons of four dozen cubes at 40 cents per carton.

Fresh Fruit and Vegetable Icing

Again this year there is a considerable increase in number of concerns reporting sales of crushed ice for fruit and vegetable icing to retail stores and gardeners and shippers. Of the 288 concerns 193 are selling crushed or sized ice to stores and 67 to gardeners and shippers. Last year a total of 175 out of 276 was reported. Prices to retail stores are from a low of 30 cents to a high of $1.40 and an average of 61.3 cents per 100 lbs. Last year the range was from 30 cents to $1.00 with an average of 58.7 cents per 100 lbs. Prices also are quoted in a few cases per bushel ranging from 25 to 50 cents with an average of 35.8 cents per bushel.

For gardeners and shippers the price range is from $4.00 to $12.00 with an average of $7.80 per ton as compared to last year's range of $4.00 to $14.00, with an average of $8.10 per ton. This shows a decreased price this year but for 1947 the average was $7.09 per ton. In 100 lb. lots the range is from 40 to 70 cents with an average of 49.9 cents.

Reicing Produce Trucks

Sales of crushed ice for reicing produce trucks continues its upward trend, with 131 of the 288 concerns quoting prices on this class of business as compared to 114 of 276 concerns last year. The price range is from a low of $3.15 to a high of $14.00 with an average of $7.79 a ton. Last year the range was from $5.00 to $12.00 with an average of $7.43 a ton.

Percentage of Ice Sold for Domestic, Commercial, Other Uses

Reports on the percentage of ice sold for different purposes show the following average (arithmetical, not weighted): domestic 52.1 per cent; commercial 38.6 per cent and other uses 9.3 per cent. Last year's report showed domestic 50.2 per cent; commercial 40.2 per cent and other uses 9.6 per cent.

(For additional details see page 32)

Annual Report of Ice Prices

Ice Prices Established for 1949 by Leading Distributors in the More Important Cities in United States and Canada—Shows Increases over Last Year

CITIES	Domestic Trade per 100 lbs. Delivered				Commercial Trade Delivered		Cash Sales at Sales Stations and Platform, per 100 lbs.					Wholesale Trade per 100 lbs. and per ton					
	Over 100 lbs.	Under 100 lbs.	Coupon Books / Rate per 100 lbs. or % discount	Minimum Delivery, lbs.	200 lbs. per delivery to 1500 lbs. per week per 100 lbs.	1500 lbs. per week to Truck lots per ton	25 Pounds	50 Pounds	100 Pounds	300 Pounds	Ton Lots	Ice Cream Mfrs., Fish Dealers, etc.	Peddlers and Dealers at Platform	Icing Cars in R. R. Yards	Icing Cars at Plant	Reicing Produce Trucks	Car Load Lots Sold f. o. b. Plant
ALABAMA																	
Anniston	.60	.60	No disc.	25	.60	$10.00	.60	.50	.50	.45	....	.....	$6.00	.....	.....	.....	.....
Gadsden	.60	.60	.....	25	.50	10.00	.60	.50	.50	.40	....	.30	7.00	.....	.....	.....	.....
Greenville	.60	.60	.....	..	.60	10.00	.60	.60	.60	.60	....	.35	.....	.....	.....	$8.00	.....
Opelika	.60	.60	No disc.	25	.60	10.00	.50	.50	.50	.40	8.00	.35	6.00	8.00	.....	8.00	6.00
ARIZONA																	
Clifton	.80	.80	5%	25	....	.....	.80	.80	.80	.60	....	.60	7.00	.....	.....	.....	.....
Flagstaff	.85	1.00	.....	25	.75	10.00	1.00	.80	.75	.62	10.00	.....	.....	.....	.....	10.00	8.00
Nogales	....	....	.....	..	....	.....	.80	.75	.65	.65	6.50	.40	6.50	.....	6.50	8.50	5.50
Safford	.80	.80	5%	25	....	.....	.80	.80	.80	.60	....	.60	7.00	.....	.....	.....	.....
Yuma	.70	.70	5%	25	.60	10.00	.60	.60	.60	.50	6.67	.50	10.00	.....	.....	6.67	.....
ARKANSAS																	
Camden	.60	.60	Cash disc.	..	.60	.....	.60	.60	.60	.60	....	.....	6.00	5.00	.....	.....	.....
Helena	.70	.70	Cash disc.	25	.70	12.00	.60	.60	.60	.60	10.00	.50	10.00	.....	.....	.....	.....
Jonesboro	.60	.60	5%	25	.45	9.00	.52	.50	.50	.50	....	.50	5.50	.....	.....	.....	.....
Little Rock	.60	.60	No disc.	25	.50	9.00	.50	.50	.50	.45	10.00	.45	6.00	.....	.....	.....	5.00
No. Little Rock	.60	.60	No disc.	25	.50	9.00	.52	.52	.51	.31	6.00	.30	6.00	6.00	6.00	6.00	6.00
Paragould	.60	.80	Cash disc.	25	.60	10.00	.52	.50	.45	.42	8.00	.45	6.00	.....	.....	.....	.....
Searcy	.60	.60	No disc.	25	.50	6.67	.60	.50	.50	.50	6.67	33⅓	6.67	10.00	10.00	10.00	10.00
Texarkana	.70	.70	No disc.	..	.60	12.00	.60	.60	.60	.50	....	.....	7.00	.....	.....	.....	.....
CALIFORNIA																	
Alturus	.80	1.00	None	25	.90	16.00	.80	.80	.75	.70	10.00	.....	.....	.....	.....	.....	.....
Long Beach	.70	.70	Cash disc.	25	.45	6.25	.80	.70	.70	.70	6.25	.70	.....	.....	.....	.....	.....
Los Angeles	.70	.80	None	25	.60	10.00	.80	.80	.80	.80	....	.30	5.00	5.00	5.00	.....	4.00
Salinas	.80	.90	.....	25	.70	.....	.80	.70	....	....	....	.....	.....	.....	.....	.....	.....
San Diego	.80	.80	Cash disc.	25	....	.....	.80	.70	.65	.60	....	.....	7.00	.....	.....	.....	.....
Santa Monica	.70	.70	None	..	.60	12.00	.80	.80	.80	....	....	.30	5.50	.....	.....	.....	.....
Washington Park	.60	.70	None	25	.60	.....	.72	.70	.70	.70	....	.....	.....	.....	.....	.....	.....
COLORADO																	
Boulder	.60	.60	Cash disc.	..	....	10.00	.80	.70	.65	....	8.00	.....	6.00	.....	.....	.....	.....
Denver	.70	.70	No disc.	25	.50	9.00	.60	.50	.45	.40	6.00	.50	5.40	5.00	4.50	6.15	4.60
Greeley	.70	.80	5½%	25	.65	7.00	.80	.70	.65	....	6.00	.65	7.00	6.25	6.25	6.25	.....
La Junta	1.00	1.00	No disc.	25	.80	.....	.80	.80	.80	.80	....	.....	6.00	.....	.....	.....	.....
Lamar	.80	1.00	No disc.	25	.70	12.00	1.00	1.00	.70	.34	....	.....	10.00	.. ..	.....	10.00	.....
Longmont	.75	.80	No disc.	25	.60	10.00	.80	.70	.65	.65	13.00	.60	7.00	.....	.....	10.00	.....
Pueblo	.78	.78	Cash disc.	12½	.55	10.00	.68	.68	.68	.55	10.00	.55	.....	6.00	.....	6.00	5.50
Sterling	.80	.80	None	25	.70	10.00	.60	.60	.60	.50	8.00	.....	.....	.....	8.00	10.00	.....
CONNECTICUT																	
Milford	.70	.70	.....	25	.60	.....	.60	.50	.40	.40	5.40	.....	5.40	.....	.....	.....	.....
Norwalk	.70	.80	No disc.	25	.60	10.00	.60	.50	.50	.42	8.00	.30	4.67	.....	.....	8.00	.....
Stamford	.70	.70	.....	30	.50	8.00	.60	.60	.50	.40	6.00	.50	5.00	.....	.....	6.00	.....
DIST. COLUMBIA																	
Washington	.70	.80	.....	25	.65	8.00	.80	.80	.80	.50	8.00	.40	5.33	.....	.....	8.00	.....
FLORIDA																	
Bartow	.60	.60	Cash disc.	25	.60	.....	....	....	.60	.55	7.00	.35	.....	7.00	.....	7.00	.....
Ft. Meyer	.68	.68	None	12½	.56	.....	.56	.56	.48	....	....	.30	6.80	.....	.....	7.00	.....
Orlando	.70	.70	Cash disc.	25	.60	10.00	.60	.60	.60	.50	9.00	.55	.....	.....	.....	9.00	.....
St. Petersburg	.60	.60	Cash disc.	12½	.50	6.00	.60	.60	.50	.35	6.00	.50	6.00	.....	.....	.....	.....
Tallahassee	.60	.60	No disc.	25	.54	10.00	.60	.60	.50	.50	....	.45	.....	.....	.....	8.00	.....
Winter Haven	.60	.60	10%	25	.50	10.00	.60	.60	.60	.50	....	.50	.....	.....	.....	.....	.....
GEORGIA																	
Augusta	.70	.70	None	25	.60	7.00	.52	.50	.50	.50	8.00	.25	8.00	.....	.....	8.00	6.00
Brunswick	.56	.56	No disc.	12	.56	11.00	....	....	.56	.56	7.00	.30	7.00	5.00	4.50	6.00	4.00
Gainesville	.50	.60	.....	25	.48	5.00	.40	.40	.40	.35	....	.....	.....	7.00	.....	.....	.....
Griffin	.60	.60	No disc.	25	.50	8.00	.60	.60	.60	.50	8.00	.50	6.00	.....	.....	8.00	.....
La Grange	.60	.60	No disc.	25	.60	.....	.50	.50	.50	.40	....	.60	6.00	.....	.....	8.00	.....
Macon	.60	.60	No disc.	12½	.60	.....	.52	.50	.50	.40	....	.30	5.00	.....	.....	.....	5.00
Valdosta	.70	.70	None	..	.60	.....	....	.60	.60	....	....	.35	6.00	.....	.....	6.00	.....
IDAHO																	
Boise	.80	.80	No disc.	25	.80	10.00	.80	.80	.80	.80	10.00	.80	10.00	.....	4.25	5.00	4.00
Caldwell	.80	.80	No disc.	25	....	.....	....	....	.60	.60	6.00	.....	7.00	.....	.....	8.00	.....
Idaho Falls	.75	.85	None	25	.75	6.00	.80	.70	.60	.50	6.00	.....	.....	5.00	5.00	.....	6.00
Twin Falls	.80	.90	No disc.	10c	....	.....	.80	.70	.70	.65	.60	.....	.....	.....	5.00	.....	.....

CITIES	Domestic Trade per 100 lbs. Delivered				Commercial Trade Delivered		Cash Sales at Sales Stations and Platform, per 100 lbs.					Wholesale Trade per 100 lbs. and per ton					
	Over 100 lbs.	Under 100 lbs.	Coupon Books / Rate per 100 lbs. or % discount	Minimum Delivery, lbs.	200 lbs. per delivery to 1500 lbs. per week per 100 lbs.	1500 lbs. per week to Truck lots per ton	25 Pounds	50 Pounds	100 Pounds	300 Pounds	Ton Lots	Ice Cream Mfrs., Fish Dealers, etc.	Peddlers and Dealers at Platform	Icing Cars in R. R. Yards	Icing Cars at Plant	Reicing Produce Trucks	Car Load Lots Mfd. Ice f. o. b. Plant
ILLINOIS																	
Belleville	.68	.68	No disc.	25	.58	11.00	.60	.60	.60	.60	9.00	.40	6.00	.....	.....	.....	.....
Bloomington	.64	.64	No disc.	25	.55	11.00	.66	.54	.54	.54	9.00	.35	5.50	7.50	6.50	-----	4.50
Champaign	.60	.60	No disc.	25	.60	12.00	.60	.60	.50	.50	5.00	.....	5.00	6.00	5.00	8.00	.....
Chicago	.60	.75	No disc.	25	.40	6.00	.40	.40	.40	.40	6.00	.25	5.00	5.00	5.00	.....	4.00
Clinton	.66	.66	Cash disc.	25	.60	10.00	.60	.56	.56	.56	....	.....	5.50	.....	6.50	9.00	.....
Danville	.60	.60	None	25	.40	7.00	....	....	.40	.35	6.00	.....	5.50	7.00	.....	7.00	.....
Fairfield	.72	.72	No disc.	25	.56	.....	.64	.64	.64	.64	....	.....	7.00	6.50	.....	10.00	.....
Harrisburg	.60	.70	No disc.	25	.60	10.00	.60	.60	.55	.42	7.00	7.00	5.00	.....	.....	7.50	.....
Mt. Vernon	.64	.64	No disc.	25	.52	9.00	....	....	.55	.50	6.00	.52	5.00	.....	.....	7.00	.....
Peoria	.66	.66	No disc.	25	.55	10.00	.52	.50	.50	.50	5.50	.27½	5.50	6.75	6.75	6.75	.....
INDIANA																	
Greensburg	.70	.70	Cash disc.	25	.60	9.00	.60	.60	.60	.50	10.00	.....	5.00	.....	7.00	10.00	.....
Indianapolis	.70	.70	No disc.	25	.65	9.00	.60	.60	.60	.50	10.00	.45	7.00	.....	.....	.....	.....
Lafayette	.70	.70	Cash disc.	25	.60	10.00	.60	.60	.60	.50	8.00	.....	.....	8.00	.....	11.00	5.00
New Albany	.60	.60	None	25	.50	8.00	.60	.50	.50	.40	8.00	.....	6.00	.....	.....	8.00	.....
New Castle	.70	.70	.....	25	.60	8.00	.60	.60	.60	.50	10.00	.....	5.00	.....	.....	.....	.....
South Bend	.70	.70	No disc.	25	.50	8.00	.60	.60	.60	.60	10.00	.55	6.00	8.00	.....	10.00	.....
Terre Haute	.60	.60	.....	25	.50	10.00	.60	.60	.60	.60	12.00	.35	7.00	6.00	6.00	6.00	5.00
Vincennes	.72	.72	Cash disc.	25	.53	9.00	.64	.64	.64	.42	8.20	.35	6.00	.....	6.00	8.00	.....
IOWA																	
Cedar Rapids	.60	.60	No disc.	25	....	.....	.60	.60	.60	....	....	.....	....	....	....	....	.....
Centerville	.70	.70	Cash disc.	25	.50	8.00	.60	.60	.60	.50	8.00	.50	6.00	8.00	5.50	8.00	4.00
Clinton	.60	.60	No disc.	25	.50	10.00	.52	.52	.50	.50	8.00	.45	.....	.....	.....	.....	.....
Dubuque	.70	.70	No disc.	50	.60	10.00	1.20	.70	.60	.60	4.50	.40	4.50	6.00	6.00	10.00	4.50
Ft. Madison	.60	.60	None	25	....	11.00	.60	.52	.52	.52	8.00	.....	6.00	.....	3.75	.....	.....
Guttenberg	.60	.60	No disc.	20	.50	8.00	.60	.60	.50	.50	8.00	.50	8.00	.....	.....	.....	.....
Keokuk	.60	.60	Cash disc.	25	.50	6.00	.60	.50	.50	.50	8.00	.47	6.00	6.50	.....	8.00	6.00
Oelwein	.70	.70	None	25	.70	10.00	1.00	.70	.70	.60	9.00	.45	5.50	9.00	.....	9.00	6.00
Waterloo	.70	.70	Cash disc.	25	.70	8.00	.60	.50	.50	.40	7.00	.40	5.00	7.00	5.00	5.00	5.00
KANSAS																	
Atchison	.70	.80	No disc.	25	.50	8.00	.60	.60	.60	.60	....	.40	7.00	5.50	.....	.....	5.50
Chanute	.80	.80	.....	25	.60	6.00	.88	.70	.70	.55	6.00	.....	6.00	10.00	6.00	.....	4.50
El Dorado	.80	.80	No disc.	25	.60	10.00	.80	.80	.80	.60	....	.....	7.00	7.00	6.00	10.00	6.00
Junction City	.60	.60	No disc.	25	.60	9.00	.56	.48	.48	.42	....	.....	6.00	8.00	.....	.....	6.00
Kansas City	.60	.60	.....	25	.50	10.00	.52	.50	.50	.50	5.50	.....	5.00	.....	.....	5.00	.....
Manhattan	.60	.60	Cash disc.	25	.55	8.00	.60	.50	.50	.35	....	.50	6.00	5.00	5.00	5.00	4.50
Topeka	.60	.60	No disc.	25	.55	10.00	.60	.60	.60	.40	6.00	.....	6.00	7.50	.....	.....	.....
Wichita	.70	.80	No disc.	12½	.50	9.00	.72	.70	.65	.65	9.00	.45	7.00	6.00	.....	.....	.....
KENTUCKY																	
Danville	.70	.70	No disc.	12	.60	10.00	.60	.60	.60	.50	....	.....	5.50	.....	10.00	8.00	.....
Frankfort	.50	.60	10%	12	.40	7.00	.60	.50	.40	.35	5.00	.....	5.00	.....	.....	.....	.....
Louisville	.60	.60	No disc.	20	.45	8.00	.50	.50	.50	.34	6.67	.25	5.67	6.50	.....	.....	4.00
Mayfield	.60	.60	10%	25	.50	9.00	.60	.50	.50	.40	....	.40	6.00	6.00	6.00	8.00	.....
Princeton	.80	.80	10%	12½	....	.....	.40	.40	.40	....	....	.....	6.00	10.00	10.00	10.00	10.00
Richmond	.70	.70	Cash disc.	25	.60	10.00	.60	.60	.60	.50	9.00	.60	5.50	.....	.....	9.00	.....
Shelbyville	.50	.60	5%	25	.50	10.00	.60	.50	.50	.42	....	.....	5.00	.....	.....	.....	.....
LOUISIANA																	
Baton Rouge	.60	.60	5%	12½	.45	8.00	.52	.50	.50	.40	8.00	.35	6.50	7.00	6.50	.....	5.50
Lafayette	.60	.60	No disc.	25	.60	8.00	.60	.60	.60	.40	8.00	.40	8.00	6.00	....	8.00	.....
Lake Charles	.50	.60	5%	12½	.50	9.00	.40	.40	.40	....	....	.40	6.00	6.00	6.00	8.00	.....
New Iberia	.60	.60	No disc.	25	.50	8.00	.60	.60	.60	.40	8.00	.30	6.50	6.25	-----	8.00	.....
New Orleans	.60	.60	None	25	.60	9.00	.60	.50	.50	.45	8.50	.....	5.50	6.20	6.20	9.00	5.50
MAINE																	
Augusta	.60	.60	No disc.	25	.50	8.00	.60	.50	.50	.42	8.00	.40	4.50	.....	.....	.....	.....
Bangor	.60	.60	None	33⅓	.40	7.00	.60	.50	.50	.40	6.00	.30	6.00	6.00	.....	.....	.....
Portland	.60	.60	No disc.	25	.40	7.00	.40	.40	.40	.40	5.00	.20	4.50	.....	.....	6.00	4.00
Rumford	.60	.60	None	20	.40	5.00	.60	.50	.50	.42	6.00	.....	5.00	.....	.....	.....	.....
Waterville	.65	.70	Cash disc.	25	.50	7.00	....	....	.30	.30	4.00	.35	.....	7.00	.....	.....	.....
MARYLAND																	
Baltimore	.60	.60	.....	25	.50	7.00	.40	.40	.40	.30	6.00	.40	4.50	.....	.....	.....	.....
Frederick	.60	.60	No disc.	12½	.50	8.00	.60	.60	.50	.35	7.00	.30	4.25	.....	.....	.....	.....
Hagerstown	.60	.60	.....	12	.50	10.00	.60	.60	.55	.42	8.50	....	5.00	.....	.....	.....	.....
Salisbury	.70	.70	None	25	.60	12.00	.60	.60	.60	.50	8.00	.60	6.00	.....	.....	7.67	5.00
MASSACHUSETTS																	
Attleboro	.70	.70	.....	25	.60	10.00	.40	.40	.40	.27	5.40	.....	5.00	.....	.....	.....	.....
Greenfield	.70	.72	No disc.	25	.70	13.00	.50	.50	.50	.40	7.00	.70	5.00	.....	.....	.....	.....
Holyoke	.70	.70	.....	30	.60	8.00	.70	.70	.50	.30	6.00	.....	5.00	8.00	.....	6.00	.....
Leominster	.70	.70	.....	30	.45	7.00	....	....	.60	.35	....	.....	4.50	.....	.....	.....	.....
Lowell	.70	1.00	None	25	.50	5.00	1.00	1.00	.70	.70	7.00	.....	4.66	.....	.....	.....	.....
Middlesboro	.70	.70	None	25	.60	8.00	.60	.60	.60	.60	....	.....	.....	.....	.....	.....	.....

CITIES	Domestic Trade per 100 lbs. Delivered				Commercial Trade Delivered		Cash Sales at Sales Stations and Platform, per 100 lbs.					Wholesale Trade per 100 lbs. and per ton					
	Over 100 lbs.	Under 100 lbs.	Coupon Books / Rate per 100 lbs. or % discount	Minimum Delivery, lbs.	200 lbs. per delivery to 1500 lbs. per week per 100 lbs.	1500 lbs. per week to Truck lots per ton	25 Pounds	50 Pounds	100 Pounds	300 Pounds	Ton Lots	Ice Cream Mfrs., Fish Dealers, etc.	Peddlers and Dealers at Platform	Icing Cars in R. R. Yards	Icing Cars at Plant	Reicing Produce Trucks	Car Load Lots M'f'd Ice f. o. b. Plant
MASSACHUSETTS—Continued																	
Needham	.70	.70	.....	15	.40	7.00	.60	.60	.60	....	....	.....	5.00	.....	.....	.....	.....
Northampton	.70	.70	.....	25	.60	10.00	....	....	.60	.50	8.00	.40	6.00	12.00	.....	.....	.....
Somerville	.70	.70	None	25	.40	6.00	.60	.50	.50	.30	6.00	.30	5.00	6.50	6.50	7.00	3.50
Springfield	.70	.70	.....	25	.60	10.00	.60	.50	.50	.34	6.00	.....	5.00	.....	.....	8.00	.....
Worcester	.70	.70	.....	25	.50	6.50	....	....	.50	.30	5.00	.25	5.00	7.00	.....	.....	.....
MICHIGAN																	
Ann Arbor	.65	.70	Cash disc.	25	.50	8.00	1.20	1.00	.60	.50	8.00	.42	5.40	10.00	.....	8.00	.....
Benton Harbor	.70	.70	No disc.	25	.60	10.00	.60	.60	.60	.50	8.00	.55	5.80	6.75	.....	8.00	.....
Coldwater	.60	.60	No disc.	25	.50	.....	.60	.60	.60	.50	6.00	.50	5.00	.....	.....	8.00	.....
Flint	.70	.70	No disc.	25	.60	10.00	.72	.70	.70	.70	....	.50	6.50	.....	.....	.....	.....
Jackson	.70	.70	No disc.	25	.50	8.00	.60	.60	.60	.40	6.00	.60	5.50	8.50	.....	.....	.....
Lansing	.60	.60	No disc.	25	.55	9.00	.52	.50	.50	.42	7.00	.....	6.60	.....	.....	.....	.....
Manistee	.70	.70	No disc.	25	.55	.....	.60	.60	.60	.60	....	.50	8.00	.....	.....	.....	.....
Traverse City	.70	.80	.....	25	.70	12.00	.60	.60	.60	.40	8.00	.40	6.00	.....	.....	.....	.....
MINNESOTA																	
Albert Lea	.75	.80	Cash disc.	25	.65	10.00	.80	.70	.65	.65	8.00	.50	6.00	5.00	.....	12.00	8.00
Minneapolis	.70	.70	Net	25	.60	10.00	.60	.60	.60	.60	6.00	.30	5.15	5.00	.....	.....	4.00
Red Wing	.70	.70	.....	25	.60	8.00	.60	.50	.50	.50	5.00	.30	5.00	6.00	.....	8.00	4.00
St. Paul	.70	.70	.....	25	.60	.....	.60	.60	....	....	....	.....	5.20	.....	.....	.....	.....
MISSISSIPPI																	
Biloxi	.61	.61	None	12½	.61	8.00	.62	.61	.61	.40	....	.....	8.00	6.00	6.00	8.00	7.00
Columbus	.60	.60	Cash disc.	25	.50	10.00	.50	.50	.50	....	....	.30	6.00	6.00	.....	6.00	.....
Hattiesburg	.60	.60	None	50	.60	.....	.52	.50	.50	.50	....	.35	6.00	.....	.....	6.00	6.00
Jackson	.70	.70	5%	12½	.50	9.00	.60	.60	.60	.50	8.00	.50	8.00	7.00	.....	7.00	.....
MISSOURI																	
Carthage	.50	.60	None	25	.50	6.00	.60	.60	.50	....	....	.45	5.00	5.50	5.50	7.00	5.00
Columbia	.65	.70	Cash disc.	25	.55	8.00	.60	.60	.50	.50	....	.30	7.20	.....	.....	.....	.....
Joplin	.60	.60	None	25	.50	10.00	.60	.60	.60	.60	8.00	.....	6.00	.....	.....	7.00	6.00
Kansas City	.70	.70	No disc.	25	.55	9.00	.60	.60	.60	.50	10.00	.....	6.50	5.75	.....	6.61	5.50
Marshall	.70	.70	Cash disc.	25	.50	8.00	.80	.60	.60	.35	....	.....	6.50	5.00	.....	6.50	.....
Meadville	.60	.60	.....	25	.60	.....	.60	.60	.60	.60	6.00	.....	6.00	.....	.....	.....	.....
Poplar Bluff	.64	.64	Cash disc.	25	.54	9.00	.56	.56	.50	.44	8.00	.45	5.60	7.00	.....	7.00	.....
Richmond	.60	.60	No disc.	..	.45	9.00	.60	.50	.50	.35	5.00	.50	5.00	7.00	5.00	.....	.....
St. Louis	.70	.70	No disc.	25	.50	8.00	.60	.60	.60	.60	10.00	.40	.....	.....	.....	.....	4.50
MONTANA																	
Billings	.60	.70	None	25	.50	5.00	.80	.80	.50	.35	5.00	.50	5.00	5.00	5.00	5.00	5.00
Butte	.80	.80	Cash disc.	25	.60	6.00	.80	.60	.60	.60	6.00	.....	4.50	12.00	8.00	.....	.....
Helena	.80	.80	No disc.	..	.60	12.00	.80	.80	.80	.80	....	.....	.....	.....	.....	.....	.....
Lewistown	.60	.70	No disc.	25	....	.....	1.00	.60	.60	.42	6.00	.....	.....	.....	.....	.....	.....
NEBRASKA																	
Falls City	.70	.70	Cash disc.	25	.65	10.00	.60	.60	....	....	....	.50	6.67	6.00	.....	.....	.....
Hebron	.60	....	No disc.	..	.60	10.00	.80	.60	.60	.60	8.40	.....	8.40	.....	.....	8.40	.....
Lincoln	.50	.60	None	25	.50	8.00	.52	.50	.50	.40	7.00	.....	6.00	.....	.....	.....	.....
North Platte	.70	.70	Cash disc.	25	.50	9.00	.60	.60	.60	.50	7.50	.40	7.50	.....	.....	9.50	.....
Omaha	.60	.60	No disc.	25	.50	8.00	.60	.50	.50	.50	8.00	.40	5.00	5.00	.....	8.50	4.00
NEVADA																	
Las Vegas	.75	.80	None	25	.75	13.00	.80	.80	.75	.73	12.00	.....	9.00	.....	.....	.....	9.00
Reno	.70	.80	.....	25	.60	8.00	1.00	.70	.60	.50	6.00	.35	....	.....	.....	.....	4.50
NEW HAMPSHIRE																	
Bristol	.65	.65	.....	25	.65	.....	.60	.60	.55	....	....	.....	.....	.....	.....	.....	.....
Claremont	.70	.70	Cash disc.	30	.60	12.00	.80	.70	.70	.70	14.00	.60	.....	12.00	14.00	14.00	.....
Manchester	.60	.70	Cash disc.	15c	.50	8.00	.60	.40	.40	.30	6.00	.30	5.50	7.00	.....	.....	.....
NEW JERSEY																	
Ashbury Park	.80	.80	Cash disc.	45	.70	12.00	....	....	....	....	....	.....	.....	.....	.....	.....	.....
Glassboro	.65	.70	.....	25	.60	.....	.80	.70	.65	.58	....	.45	5.33	.....	5.50	.....	.....
Millville	.70	.70	.....	130	.60	7.00	.60	.60	.60	.40	7.00	.40	6.00	6.00	5.00	8.00	4.00
NEW MEXICO																	
Santa Fe	.70	.70	No disc.	25	.70	10.00	.60	.60	.60	.60	10.00	.....	10.00	.....	.....	10.00	.....
Tucumcari	.70	.70	.....	25	.70	10.00	.80	.70	.70	.60	6.00	.....	6.00	5.50	.....	6.67	5.00
NEW YORK																	
Auburn	.80	.80	No disc.	25	.70	12.00	.60	.60	.60	.60	12.00	.60	12.00	10.00	8.00	8.00	.....
Binghampton	.70	.70	Cash disc.	25	.60	10.00	.60	.50	.50	.30	6.00	.....	5.00	.....	.....	6.00	.....
Jamestown	.70	.70	.....	25	.42	8.40	.60	.50	.50	.40	7.00	.....	7.00	6.00	6.00	.....	.....
Kingston	.50	.60	None	25	.40	6.00	.40	.40	.40	.25	6.00	.25	6.00	8.00	.....	8.00	.....
New York	.60	.60	None	50	.45	7.00	.40	.40	.40	.22	4.30	.25	4.30	7.00	4.30	7.00	4.30
Poughkeepsie	.60	.60	.....	25	.55	10.00	....	....	....	....	....	.....	.....	10.00	.....	.....	.....

CITIES	Domestic Trade per 100 lbs. Delivered				Commercial Trade Delivered		Cash Sales at Sales Stations and Platform, per 100 lbs.					Wholesale Trade per 100 lbs. and per ton					
	Over 100 lbs.	Under 100 lbs.	Coupon Books — Rate per 100 lbs. or % discount	Minimum Delivery, lbs.	200 lbs. per delivery to 1500 lbs. per week per 100 lbs.	1500 lbs. per week to Truck lots per ton	25 Pounds	50 Pounds	100 Pounds	300 Pounds	Ton Lots	Ice Cream Mfrs., Fish Dealers, etc.	Peddlers and Dealers at Platform	Icing Cars in R. R. Yards	Icing Cars at Plant	Retcing Produce Trucks	Car Load Lots Mfd. Ice f. o. b. Plant
NEW YORK—Continued																	
Rochester	.80	.80	Cash disc.	25	.80	10.00	.72	.70	.70	.60	....	.45	6.00	12.00	.....	8.00	6.00
Watertown	.60	.60	No disc.	25	.50	4.00	.60	.50	.45	....	5.00	.....	.....	.....	.....	.....	.....
NORTH CAROLINA																	
Asheville	.60	.60	No disc.	25	.50	8.00	.52	.50	.50	.40	8.00	.....	7.00	8.00	5.50	7.00	.....
Charlotte	.60	.60	No disc.	25	.60	9.00	.60	.50	.50	.40	8.00	.....	7.00	5.50	.....	.....	5.00
Goldsboro	.60	.60	No disc.	25	.60	10.00	.60	.60	.60	.50	10.00	.....	7.00	.....	.....	8.00	.....
Greensboro	.60	.60	No disc.	25	.50	7.00	.60	.50	.50	.35	7.00	.25	6.00	10.00	.....	7.00	.....
Henderson	.60	.60	No disc.	12½	.50	10.00	.60	.60	.60	.50	10.00	.40	8.00	.....	.....	.....	.....
Wilmington	.50	.60	.....	25	.55	8.00	....	....	.50	.30	....	.25	6.00	.....	.....	.....	.....
Winston-Salem	.50	.60	No disc.	25	.50	10.00	.52	.50	.50	.35	7.35	.50	6.00	7.35	.....	7.35	5.00
NORTH DAKOTA																	
Bismarck	.80	.80	Cash disc.	25	....	.....	.80	.80	.80	.70	6.00	.....	.....	.....	.....	.....	6.00
Grand Forks	.65	.70	Cash disc.	25	.60	6.00	.60	.50	.45	.40	6.00	.30	.....	5.00	.....	.....	.....
Jamestown	.75	.75	Cash disc.	25	.75	.....	1.00	.76	.76	.76	12.00	.....	.....	.....	.....	12.00	.....
OHIO																	
Ashland	.74	.74	Cash disc.	25	.60	10.00	.80	.60	.60	.50	8.00	.35	.....	.....	.....	.....	.....
Dayton	.70	.70	.....	25	....	12.00	.80	.60	.60	.45	6.50	.45	6.50	.....	.....	6.50	6.50
Findlay	.70	.70	No disc.	25	.45	9.00	.60	.60	.60	.60	....	.....	6.00	7.00	.....	.....	5.00
Hamilton	.70	.70	No disc.	25	.60	10.00	....	....	.60	.50	....	.50	7.00	10.00	.....	.....	6.00
Lima	.70	.70	No disc.	25	.62	8.00	.60	.60	.60	.35	12.00	.35	5.50	5.00	.....	.....	.....
Mansfield	.70	.70	Cash disc.	25	.50	8.00	.60	.50	.50	.42	7.00	.40	6.00	10.00	.....	10.00	.....
Middletown	.70	.70	.....	..	.60	8.00	.60	.60	.60	.45	....	.....	.....	.....	.....	.....	.....
Piqua	.60	.50	No disc.	25	.50	8.00	.52	.50	.50	.40	....	.....	4.60	.....	.....	.....	.....
Tiffin	.70	.70	No disc.	25	.60	10.00	.60	.60	.60	....	8.00	.40	.....	.....	.....	.....	.....
Troy	.70	.70	No disc.	26	.60	10.00	.60	.60	.60	.50	10.00	.60	6.00	.....	.....	.. ...	.....
OKLAHOMA																	
Bartlesville	.70	.70	2%	25	.55	9.00	.60	.50	.55	.40	8.00	.....	6.00	.....	.....	9.00	.....
Bristow	.80	.80	No disc.	25	.70	12.00	.80	.70	.70	.40	7.00	.40	7.00	.....	.....	.....	.....
Chickasaw	.60	.60	None	25	.50	10.00	.52	.50	.50	.50	10.00	.50	6.00	7.00	6.00	6.70	6.00
Duncan	.70	.70	Cash disc.	..	.70	.....	.60	.60	.60	....	....	.56	7.50	.....	.....	.....	.....
Lawton	.70	.70	Cash disc.	..	.70	.....	.60	.60	.60	....	....	.56	7.50	.....	.....	.....	.....
O'Keene	.65	.70	No disc.	25	.60	.....	.72	.70	.65	.65	....	.....	6.00	.....	.....	.....	.....
Okmulgee	.70	.70	Cash disc.	..	.70	.....	.60	.60	.60	....	....	.56	7.50	.....	.....	.....	.....
Ponca City	.80	.80	No disc.	12½	.60	8.00	.80	.70	.70	....	....	.30	8.00	.....	.....	.....	.....
Purcell	.70	.72	No disc.	25	.60	12.00	.60	.60	.60	.50	8.00	.....	8.00	.....	.....	8.00	.....
Shawnee	.60	.70	.....	12½	.50	10.00	.60	.50	.50	.45	6.00	.....	7.00	7.00	.....	.....	6.00
Tulsa	.71	.71	Cash disc.	..	.60	12.00	.60	.60	.60	.40	....	6.00	7.40	.....	7.50	.....	5.50
Walters	.65	.70	Cash disc.	12½	.50	7.00	.60	.60	.55	....	....	.....	7.00	7.00	.....	8.00	.....
Weatherford	.80	.80	Cash disc.	..	....	.....	.72	.70	.70	....	....	.....	.....	.....	.....	.....	.....
OREGON																	
Ashland	1.00	1.00	None	25	.95	12.00	1.00	1.00	1.00	1.00	12.00	.....	12.00	.....	.....	.....	.....
Baker	1.00	1.00	Cash disc.	25	.60	10.00	1.00	1.00	1.00	....	....	.60	.....	.....	.....	12.00	.....
Bend	1.00	1.50	.....	..	....	.....	1.00	1.00	1.00	.50	7.00	.....	.....	.....	.....	.....	.....
Portland	.90	1.00	Cash disc.	25	.70	.....	.80	.70	.65	.52	7.00	.35	7.00	.....	.....	.....	.....
PENNSYLVANIA																	
Berwick	.50	.50	.....	..	.40	8.00	.60	.50	.40	.40	....	.40	5.00	10.00	8.00	8.00	.....
Braddock	.70	.80	Cash disc.	25	.70	12.00	1.00	.80	.70	.20	....	.60	6.60	.....	.....	.....	.....
Chambersburg	.40	....	.....	..	....	3.15	.40	.40	.40	.20	3.15	.....	3.15	4.00	4.00	3.15	.....
Gettysburg	.70	.70	None	25	.70	10.00	.80	.70	.70	.50	8.00	.70	8.00	.....	10.00	10.00	.....
Harrisburg	.60	.60	.....	25	.50	9.00	.60	.50	.50	.50	....	.50	5.00	.....	.....	.....	.....
Lancaster	.75	.80	.....	25	.65	11.00	.60	.60	.60	.45	7.00	.50	4.00	10.00	6.00	6.00	4.00
Lebanon	.50	.50	None	20	.40	.....	.60	.50	.40	.25	....	.40	4.00	6.50	.....	.....	.....
New Castle	.70	.70	5%	25	.45	10.00	.60	.60	.60	.40	....	.50	5.00	7.50	.....	.....	4.00
Pittsburgh	.70	.70	65c	25	.70	9.00	.68	.66	.65	.55	11.00	.....	6.60	10.00	.....	.....	4.00
Pottstown	....	....	.....	..	.50	10.00	.60	.50	.50	.34	10.00	.50	5.40	6.00	6.00	.....	.....
Schuykill Haven	.60	.60	.....	25	.50	5.60	.60	.60	.50	.34	....	.50	5.60	6.00	.....	.....	.....
Scranton	.50	.60	None	25	.40	5.50	.40	.40	.35	.30	6.00	.30	5.00	.....	.....	7.00	.....
Sharon	.77	.80	10%	25	.60	7.00	.60	.58	.57	.42	6.00	.....	7.00	.....	.....	.....	.....
RHODE ISLAND																	
Block Island	.50	.50	.....	..	....	.....	.60	.50	.50	....	....	.25	5.00	.....	.....	.....	.....
Pawtucket	.65	.65	None	33⅓	.45	6.50	.60	.55	.50	.40	5.00	.40	4.00	9.00	.....	.....	.....
Providence	.70	.70	.....	25	.45	.....	.40	.40	.40	.25	....	.25	4.00	5.50	.....	5.50	.....
SOUTH CAROLINA																	
Anderson	.60	.60	No disc.	25	.50	.....	.60	.50	.50	.50	....	.....	6.00	.....	.....	.....	.....
Camden	.55	.60	Cash disc.	10c	....	.....	.65	.60	.50	1.20	....	.40	6.67	.....	.....	.....	.....
Greenville	.60	.60	No disc.	..	.45	9.00	....	....	.50	.34	6.67	.....	6.67	6.67	6.67	6.67	5.00
Orangeburg	.60	.65	.....	50	.65	7.50	.80	.70	.60	.50	....	.60	7.50	.....	.....	8.00	.....
Seneca	.70	.70	10c	25	.70	.....	.60	.60	.60	.50	....	.....	6.00	.....	.....	.....	.....
Sumter	.60	.60	10%	25	.54	8.25	.60	.60	.60	.60	8.25	.41⅔	8.25	9.00	6.00	7.00	4.00

CITIES	Domestic Trade per 100 lbs. Delivered				Commercial Trade Delivered		Cash Sales at Sales Stations and Platform, per 100 lbs.					Wholesale Trade per 100 lbs. and per ton					
	Over 100 lbs.	Under 100 lbs.	Coupon Books Rate per 100 lbs. or % discount	Minimum Delivery, lbs.	200 lbs. per delivery to 1500 lbs. per week per 100 lbs.	1500 lbs. per week to Truck lots per ton	25 Pounds	50 Pounds	100 Pounds	300 Pounds	Ton Lots	Ice Cream Mfrs., Fish Dealers, etc.	Peddlers and Dealers at Platform	Icing Cars in R. R. Yards	Icing Cars at Plant	Reicing Producc Trucks	Car Load Lots Mf'd Ice f. o. b. Plant
SOUTH DAKOTA																	
Aberdeen	.80	.80	No disc.	25	.60	9.00	.60	.60	.60	.60	7.00	.....	.....	.....	.....	.....	4.50
Deadwood	.78	.78	.....	25	....	.....	1.00	.70	.70	.50	....	.....	.....	.....	.....	.....	5.60
Gregory	1.00	1.00	Cash disc.	35c	1.00	17.50	1.20	.90	.85	.70	14.00	.....	14.00	12.50	.....	.....	.....
Rapid City	.70	.70	No disc.	25	.60	11.00	.68	.60	.60	.40	6.50	.50	6.50	7.50	7.00	7.00	5.00
Sioux Falls	.80	.80	Cash disc.	25	.60	10.00	.80	.60	.60	....	....	.50	6.00	5.00	5.00	6.00	5.00
TENNESSEE																	
Cleveland	.60	.60	None	25	.60	10.00	.60	.60	.60	.50	6.00	.....	6.00	.....	.....	10.00	.....
Morristown	.60	.60	No disc.	25	.60	6.00	.60	.60	.60	.60	12.00	.34	6.00	6.00	6.00	6.00	.....
Mt. Pleasant	.60	.60	5%	25	.60	8.00	.60	.60	.60	.50	....	.....	.....	.....	.....	.....	.....
Tullahoma	.60	.60	Cash disc.	12½	.50	8.00	.60	.50	.50	.40	8.00	.....	5.70	8.00	8.00	8.00	8.00
TEXAS																	
Brady	.70	.70	No disc.	25	.70	.....	.60	.50	.50	.45	7.00	.....	7.00	7.00	6.00	8.00	.....
Commerce	.60	.60	Cash disc.	12½	.52	10.50	.60	.60	.60	.50	7.00	.....	6.00	5.50	.....	7.00	6.00
Dallas	.60	.60	No disc.	25	.50	.....	.52	.50	.50	.50	10.00	.30	5.50	.....	.....	.....	5.00
Denton	.60	.60	No disc.	25	.45	7.00	.60	.50	.50	.45	7.00	.35	7.00	.....	.....	9.00	6.50
Ft. Worth	.60	.60	No disc.	25	.50	10.00	.52	.50	.50	.32	....	.50	6.40	.....	.....	6.40	.....
Graham	.60	.60	No disc.	25	.60	8.00	.60	.60	.55	.43	8.65	.60	6.67	6.00	.....	.....	.....
Greenville	.70	.70	No disc.	25	.70	7.00	.60	.60	.60	....	....	.50	7.00	6.00	6.00	7.00	5.50
Hillsboro	.70	.70	No disc.	25	.70	12.00	.60	.60	.60	.60	12.00	.....	6.67	6.00	.....	6.67	6.00
Houston	.60	.60	Net	25	.60	9.00	.60	.60	.60	.50	10.00	.....	5.50	.....	.....	10.00	.....
Longview	.50	.50	No disc.	25	.50	.....	.52	.50	.50	.50	10.00	.25	5.00	.....	10.00	10.00	.....
Overton	.70	.70	No disc.	25	.70	.....	.60	.60	.60	.60	....	.....	6.00	.....	.....	.....	.....
Plainview	.70	.80	Cash disc.	25	.60	12.00	.80	.70	.70	.60	....	.....	7.70	7.00	.....	.....	.....
UTAH																	
Ogden	.60	.70	No disc.	20	.45	8.00	.52	.50	.40	.35	5.50	.40	5.00	.....	.....	5.00	4.00
Salt Lake City	.65	.70	Cash disc.	25	.45	7.20	.60	.50	.35	.30	5.00	.36	.....	.....	.....	6.00	4.50
VERMONT																	
Bennington	.70	.70	No disc.	50	.70	14.00	1.00	.70	.70	.70	12.00	.....	10.00	.....	.....	12.00	.....
Brattleboro	.70	.70	Cash disc.	25	.50	9.00	.72	.70	.65	.65	8.00	.....	6.00	.....	.....	.....	.....
Rutland	.70	.70	None	25	.50	8.00	.80	.60	.60	.33	5.00	.....	5.00	.....	.....	5.00	.....
Springfield	.60	.60	No disc.	20	.50	8.00	.60	.50	.50	.50	8.00	.40	6.00	.....	.....	.....	.....
VIRGINIA																	
Alexandria	.65	.65	.....	25	.55	10.00	.60	.60	.50	.43	6.00	.....	5.25	.....	.....	6.00	4.50
Charlottesville	.70	.80	Cash disc.	10	.45	7.00	.80	.60	.50	.40	8.00	.40	6.00	7.00	.....	8.00	.....
Danville	.70	.70	No disc.	25	.55	.....	.72	.70	.70	.55	11.00	.....	.....	6.50	.....	.....	.....
Hopewell	.60	.60	None	..	....	9.00	.60	.60	.60	.45	....	.45	.....	.....	.....	.....	.....
Yorktown	.60	.60	No disc.	..	.50	.....	.60	.60	.60	.50	....	.....	.....	7.50	.....	.....	.....
WASHINGTON																	
Aberdeen	.85	1.00	Cash disc.	25	.70	6.25	.80	.70	.70	.60	5.25	.70	6.50	6.00	6.00	6.75	.....
Longview	.85	1.00	Cash disc.	25	.50	.....	.80	.70	.65	.50	8.00	.50	8.00	.....	.....	.....	.....
Tacoma	.70	.80	5%	25	.55	10.00	....	....	....	....	....	.....	.....	.....	.....	.....	.....
Yakima	.80	.80	No disc.	20	.70	7.00	.60	.60	.60	6.50	.35	.33	8.00	4.85	7.50	5.00	.....
WEST VIRGINIA																	
Beckley	.75	.80	No disc.	25	.65	11.00	.60	.60	.60	.60	....	.....	.....	.....	.....	8.40	.....
Bluefield	.60	.60	Net	25	.60	10.00	.60	.60	.60	.50	8.00	.40	7.00	.....	.....	8.00	5.00
Charleston	.70	.70	Net	12½	.60	10.00	.60	.60	.60	.50	10.00	.42	6.67	8.00	.....	10.00	6.00
Huntington	.60	.60	5%	12½	.45	9.00	.56	.48	.45	.40	....	.....	6.00	8.00	.....	.....	5.00
Ranson	.60	.60	No disc.	10	.55	10.00	.56	.56	.55	.45	9.00	.....	5.50	.....	4.75	.....	5.00
WISCONSIN																	
Ashland	.50	.60	Net	50	.50	9.00	.80	.50	.45	.40	6.00	.45	6.00	6.50	.....	6.00	.....
Fond du Lac	....	....	.....	..	....	.....	.52	.50	.50	.50	10.00	.40	4.00	.....	4.25	.....	.....
Green Bay	.60	.60	No disc.	25	.50	.....	.60	.50	.50	.50	4.00	.25	4.00	6.00	4.50	6.00	6.00
Manitowoc	.60	.70	No disc.	25	.50	8.00	.80	.60	.45	.45	5.00	.40	5.00	.....	.....	9.00	.....
Menasha	.70	.70	No disc.	25	.60	10.00	.60	.60	.60	.60	10.00	.50	.....	.....	.....	.....	.....
Milwaukee	.70	.70	No disc.	25	.30	.....	....	.50	.50	.50	5.00	.....	.....	.....	.....	7.00	4.00
Sheboygan	.72	.72	Cash disc.	25	.60	11.20	.60	.60	.60	.55	5.00	.55	6.90	.....	.....	8.00	.....
Waukesha	.70	.70	No disc.	25	.60	.....	.60	.60	.60	....	....	.....	.....	.....	.....	.....	.....
Wausau	.60	.60	Cash disc.	25	.40	8.00	....	....	.50	.50	5.00	.....	.....	.....	.....	.....	.....
WYOMING																	
Casper	.60	.70	None	25	.50	8.00	.60	.60	.50	.40	7.00	.50	7.00	6.00	6.00	6.00	5.00
Cheyenne	.70	.70	No disc.	25	.60	12.00	.80	.70	.70	.60	10.00	.....	6.80	.....	7.00	.....	5.00
Laramie	1.00	1.00	No disc.	50	.80	.....	1.00	1.00	.80	....	....	.....	.....	.....	.....	.....	.....
Sheridan	.80	.90	Cash disc.	25	.75	14.00	.80	.70	.60	.45	8.00	.....	6.00	7.50	.....	.....	.....
Wheatland	.80	.80	.....	..	.70	7.00	.80	.80	.80	.70	6.00	.....	6.00	.....	.....	.....	6.00
CANADA																	
Montreal	.60	.60	No disc.	25	.40	6.00	.40	.40	.40	.40	5.00	.....	.....	5.10	.....	.....	3.50
Ottawa	.50	.60	Cash disc.	25	.44	.....	.60	.60	.60	....	5.00	.35	5.00	.....	.....	.....	.....
Toronto	.60	.60	.....	25	.40	7.00	.60	.60	.70	.70	5.00	.35	5.00	5.50	5.00	.....	3.75

Table I shows the average price of ice per 100 lbs. and per ton in each state in the four divisions into which the country has been divided.

TABLE I—AVERAGE PRICE OF ICE PER 100 LBS. AND PER TON IN STATES BY GROUPS, 1949

State	Dom. Trade 100 lbs.	Light Commercial 100 lbs.	Heavy Commercial 100 lb.	Dealers Per Ton	Car Icing Per Ton	Carload Per Ton
EASTERN STATES—67 REPORTS						
Connecticut	71.7c	56.7c	$9.00	$5.02	....	....
D. C.	75.0c	65.0c	8.00	5.33	....	....
Maine	61.5c	44.0c	6.80	5.00	6.50	4.00
Maryland	62.5c	52.5c	9.25	4.94	....	5.00
Massachusetts	71.5c	54.1c	8.23	5.02	8.00	3.50
New Hampshire	66.7c	56.3c	10.00	5.50	11.00	....
New Jersey	72.5c	63.3c	9.50	5.66	5.50	4.00
New York	66.9c	55.3c	8.43	6.72	7.92	5.06
Pennsylvania	64.0c	54.2c	8.83	5.68	7.23	4.00
Rhode Island	61.7c	45.0c	6.50	4.34	7.25	....
Vermont	67.5c	55.0c	9.75	6.75	....	....
Virginia	66.0c	51.2c	8.67	5.62	7.00	4.50
West Virginia	65.5c	57.0c	10.00	6.29	6.92	5.25
AVERAGE PRICE	67.2c	54.6c	8.69	5.61	7.48	4.41
SOUTHERN STATES—76 REPORTS						
Alabama	60.0c	57.5c	$10.00	$6.34	$8.00	$6.00
Arkansas	63.7c	55.6c	9.69	6.65	7.40	7.00
Florida	62.4c	55.3c	9.00	6.40	7.00	....
Georgia	61.6c	56.3c	7.75	6.33	5.50	5.00
Louisiana	59.0c	53.0c	8.40	6.50	6.27	5.50
Mississippi	62.7c	55.2c	9.00	7.00	4.17	6.50
North Carolina	58.6c	53.6c	8.86	6.71	7.27	5.00
Oklahoma	70.9c	60.4c	10.00	7.48	7.17	5.75
South Carolina	61.7c	56.8c	8.25	6.85	7.08	4.50
Tennessee	60.0c	57.5c	8.00	8.85	7.00	....
Texas	63.8c	58.9c	9.44	6.55	6.61	5.80
AVERAGE PRICE	62.2c	56.4c	8.94	6.88	6.68	5.78
MIDWESTERN STATES—82 REPORTS						
Illinois	65.2c	53.6c	$9.55	$5.45	$6.23	$4.25
Indiana	67.7c	56.0c	8.87	6.00	6.83	5.00
Iowa	64.4c	57.1c	9.00	5.86	6.31	5.10
Kansas	68.7c	55.0c	8.75	6.25	7.00	5.30
Kentucky	64.3c	50.8c	9.00	5.52	8.08	7.00
Michigan	67.8c	56.3c	9.50	6.10	8.42	....
Minnesota	71.9c	61.5c	9.33	5.34	5.34	5.34
Missouri	64.1c	52.1c	8.37	5.97	5.82	5.25
Ohio	68.9c	56.3c	9.30	5.97	8.00	5.83
Wisconsin	64.0c	53.7c	9.25	5.18	5.31	5.00
AVERAGE PRICE	66.7c	55.2c	9.09	5.76	6.73	5.34
WESTERN STATES—60 REPORTS						
Arizona	80.6c	67.5c	$10.00	$7.62	$6.50	$6.75
California	76.4c	64.2c	11.06	5.83	5.00	4.00
Colorado	78.8c	64.3c	9.73	6.90	6.00	5.05
Idaho	81.2c	77.5c	8.00	8.50	4.81	5.00
Montana	72.5c	56.7c	7.67	6.00	7.50	5.00
Nebraska	63.3c	55.0c	9.00	6.71	5.50	4.00
Nevada	76.2c	67.5c	10.50	9.00	....	6.25
New Mexico	70.0c	70.0c	10.00	8.00	5.50	5.00
North Dakota	73.0c	67.5c	6.00	....	5.00	6.00
Oregon	105.0c	75.0c	11.00	9.50	....	....
South Dakota	81.6c	70.0c	11.87	8.83	7.40	5.02
Utah	66.2c	45.0c	7.60	5.00	....	4.25
Washington	85.0c	61.2c	7.75	7.50	6.18	....
Wyoming	80.0c	67.0c	8.25	6.45	6.62	5.34
AVERAGE PRICE	77.8c	64.9c	9.17	7.37	6.01	5.14

Table II presents summaries of the prices compiled in Table I for ice sold at retail, both for the domestic and commercial trade.

T E II—SUMMARY OF ICE PRICES PER HUNDRED POUNDS AND PER TON—1949

Section	Domestic Trade 100 lbs.	Light Commercial 100 lbs.	Heavy Commercial per ton
Eastern States	67.2c	54.6c	$8.69
Southern States	62.2c	56.4c	8.94
Midwestern States	66.7c	55.2c	9.09
Western States	77.8c	64.9c	9.17
GENERAL AVERAGE	68.5c	57.8c	$8.97

Table III presents summaries of the prices compiled in Table I for wholesale ice in each class of trade in the four sections, also the general average.

TABLE III—AVERAGE PRICE PER TON FOR DEALERS CAR ICING, CARLOADS

Section	Dealer Sales Per Ton	Car Icing Per Ton	Carload Sales Per Ton
Eastern States	$5.61	$7.48	$4.41
Southern States	6.88	6.68	5.78
Midwestern States	5.76	6.73	5.34
Western States	7.37	6.01	5.14
GENERAL AVERAGE	$6.41	$6.73	$5.17

Table IV shows the average price charged for the different classes of trade over the last seven years. It will be noted that for 1948 there is a substantial increase for each class except dealers.

TABLE IV—AVERAGE PRICES CHARGED FOR ICE, VARIOUS CLASSES OF TRADE, 1943–1949

	1943	1944	1945	1946	1947	1948	1949
Domestic	57.6c	57.5c	58.9c	59.4c	64.5c	67.2c	68.5c
Commercial	40.0c	41.5c	42.4c	41.5c	47.0c	50.6c	51.3c
Dealers	$5.45	$5.50	$5.56	$5.72	$6.13	$6.04	$6.41
Car Icing	4.94	4.92	5.17	5.45	5.77	6.68	6.73
Carloads	4.14	4.24	4.28	4.61	4.70	4.92	5.17

Table V gives the average price for domestic trade in different sections of the country for 1939-49, inclusive. Here also there is a substantial increase in all sections, the largest being in the southern states.

TABLE V—AVERAGE PRICES FOR DOMESTIC TRADE IN DIFFERENT SECTIONS—1939–1949

Year	Eastern	Southern	Midwestern	Western
1939	53.3c	49.8c	51.6c	67.3c
1940	52.0c	48.3c	50.9c	64.1c
1941	53.1c	45.6c	50.9c	65.0c
1942	55.9c	50.6c	53.9c	66.5c
1943	57.2c	52.3c	55.0c	66.0c
1944	58.5c	52.4c	55.8c	63.8c
1945	57.5c	52.1c	56.1c	69.7c
1946	59.4c	52.2c	56.5c	69.4c
1947	63.3c	59.3c	60.8c	74.5c
1948	66.9c	60.3c	65.0c	76.6c
1949	67.2c	62.2c	66.7c	77.8c

Table VI shows the average price received for domestic ice, wholesale ice and all ice sold. The grand average for all ice sold, as shown in this table, is $8.73 per ton as compared with $8.55 per ton last year and $8.05 the year before.

TABLE VI—AVERAGE PRICE OF ICE—1949

	Per Cwt.	Per Ton
AVERAGE PRICE RECEIVED FOR DELIVERED ICE—1949		
Domestic Trade	68.5c	$13.70
Light Commercial Trade	57.8c	11.56
Heavy Commercial Trade	44.8c	8.97
GENERAL AVERAGE	57.0c	$11.33
AVERAGE PRICE RECEIVED FOR WHOLESALE ICE—1949		
Dealers		$ 6.41
Car Icing		6.73
Carload Ice		5.17
GENERAL AVERAGE		6.10
AVERAGE PRICE RECEIVED FOR ALL ICE SOLD—1949		
Delivered Ice		$11.36
Wholesale		6.10
GRAND AVERAGE ALL ICE SOLD		$ 8.73

Table VII shows the range in price for the different classes of trade in various sections. As usual these prices show considerable variation in all sections due to local conditions. This variation however appears to show a wider spread than in previous years.

TABLE VII—RANGE OF PRICES OF DIFFERENT CLASSES OF TRADE IN VARIOUS SECTIONS

	High	Low	Diff.	High	Low	Diff.
	EASTERN			SOUTHERN		
Domestic Trade	75.0c	61.5c	13.5c	70.9c	58.6c	12.3c
Light Commercial	65.0c	44.0c	21.0c	60.4c	53.0c	7.4c
Heavy Commercial	$10.00	$6.50	$3.50	$10.00	$8.00	$2.00
Dealers	6.75	4.34	2.41	8.85	6.33	2.52
Car Icing	11.00	5.50	5.50	8.00	4.17	3.83
Carload	5.25	3.50	1.75	7.00	4.50	2.50
	MIDWESTERN			WESTERN		
Domestic Trade	68.9c	64.0c	4.9c	105.0c	63.3c	41.7c
Light Commercial	61.5c	50.8c	10.7c	77.5c	45.0c	32.5c
Heavy Commercial	$9.55	$8.37	$1.18	$11.87	$6.00	$5.87
Dealers	6.25	5.18	1.07	9.50	5.00	4.50
Car Icing	8.42	5.31	3.11	7.50	4.81	2.69
Carload	7.00	4.25	2.75	6.75	4.00	2.75

In the tables showing the reports from the various cities, Canadian prices are included but they are not included in the above analysis. Prices reported from these Canadian points are somewhat higher than last year.

The Ice Industry

National Association of Ice Industries

Executive Offices
1706 L St. N. W., Washington 6, D. C.

PRESIDENT
M. J. Garvey, St. Joseph, Mo.

EXECUTIVE SECRETARY
Mount Taylor, Washington, D. C.

National Ice Merchandising Forum

State Groups Formed to Push Sales of Ice and Appliances

THE National Ice Merchandising Forum has been organized by the Personnel Training and Marketing Department of the National Association of Ice Industries for the purpose of encouraging and planning more active merchandising of all forms of ice and ice-using appliances.

Forums have been organized for the states of Ohio, Texas, Oklahoma, Kansas, Missouri, Illinois, Arkansas, Louisiana, Mississippi, Massachusetts, New Hampshire, Vermont, Connecticut, Rhode Island and Maine. A state chairman for each state has been appointed in the organizational meetings and, with one exception, all of the states have been divided into one or more zones with sub-chairmen for the conduct of at least four merchandising conferences a year, all to tie in with the National Ice Merchandising Forum Plan. Organizational meetings will be held in other states in the near future.

The organization work will be carried on through and with the cooperation of the unit ice associations. Those which already have a Merchandising Council or Committee will continue with this committee, assuming the responsibility for over-all guidance of this activity, in addition to its other responsibilities. It is suggested, however, that local merchandising forum chairmen be appointed who will, under the guidance of the merchandising committee and with the cooperation of the association secretary, be responsible for carrying on activities of local ice merchandising.

For those who have no Merchandising Committee or Council, the first step will be appointment by the association president of a merchandising committee, this committee to take on the responsibility for the organization and over-all guidance of this new merchandising activity.

After formation of the organization, it is recommended that at least four regular meetings of all merchandisers in the association be held during each twelve months. In some cases where the territory is large, sectional meetings will be held in different parts of the territory and the same, or a similar agenda, could be used for these duplicate meetings. The agenda for these meetings should be drawn by the program committee to bring out the most current merchandising problems in each area and seek possible solutions and developments of new selling ideas to overcome these problems.

Tying together all the local ice merchandising forums into an industry-wide merchandising plan, the National Ice Merchandising Forum will be composed of the chairmen of the unit associations merchandising committees and the chairmen of the local ice merchandising forums now formed or to be set up. These chairmen will meet with the Personnel Training and Marketing Department committee from time to time as seems desirable.

Functions of the Forum

Some of the over-all functions of the National Ice Merchandising Forum will be:

1—To hold an annual merchandising forum session during, and as part of, each annual National convention program under the sponsorship of the Personnel Training and Marketing Department.

2—To encourage and stimulate more aggressive merchandising activities among participants of local ice merchandising forums within the association framework, to promote greater use of ice and ice-using appliances and the adoption of approved methods and distribution of the product.

3—To encourage and aid unit associations and their member companies to carry forward more effective and organized merchandising activity . . . in the form of merchandising forum meetings conducted under the auspices of the unit association merchandising committees . . . and to be of all possible assistance in the conduct of these merchandising conferences.

4—To encourage follow-through in expanding the use of ice appliances, and merchandising ice in its various forms in all present and prospective fields.

5—To gather and disseminate practical and useful information relating to merchandising and distribution phases of the ice business through the medium of a special merchandising bulletin to be called the "Ice Merchandiser," which will be distributed to all forum participants.

6—To promote cordial relations and good-will and to facilitate the free exchange of merchandising ideas and plans among participants in unit association merchandising forums.

7—To get the "feel" of ice merchandising problems in the field . . . to discuss with merchandising leaders what may be needed—not now being produced by the National Association—to meet these problems . . . to get frank expressions of how the National Association can cooperate more fully to solve these problems and bring about a closer relationship between the National and unit organizations.

After the spadework of these organizational meetings within the unit associations is accomplished the job then will be for the Personnel Training and Marketing Department to follow through in cooperation with the unit association merchandising committee chairmen and the unit association secretaries.

National Ice Marketing Institute Sixth and Seventh Classes

THE sixth class of the National Ice Marketing Institute, known as "The Three R's" (Ruppert's Rugged Readers), was graduated February 25, with the Industry Committee of the Personnel Training and Marketing Department as guests at the graduation ceremonies. Paul H. Andres (Committee Chairman), president, Southwest Ice & Dairy Products, Oklahoma City, Okla.; Richard C. Muckerman, executive vice-president, City Ice & Fuel Co., St. Louis, Mo.; and Alex S. Hill, general manager, Arkansas Ice & Storage Co., North Little Rock, Ark., were introduced to the graduating class and asked to speak informally, by Daniel A. Prager, director of the Personnel Training and Marketing Department. George Sherrod (member of the Charter Class), president of the Greensboro Ice & Coal Co., Greensboro, N. C., was also a guest at the graduation dinner.

Mount Taylor, executive secretary of the National Association of Ice Industries, presented the twenty-two graduates with diplomas and announced the honor graduates—David Denmead, Artesian Ice Co., Fort Madison, Iowa, and Keith Miller, Crystal Ice Co., Lubbock, Texas. Isaac Greenberg, Toronto, Canada, is the first member of the Canadian Association of Ice Industries to attend the institute. Although the class was predominantly Texan with five men from that state, eleven other states were well represented including Connecticut, Georgia, Indiana, Kansas, Kentucky, Michigan, North Carolina, Ohio, Oklahoma, Pennsylvania, and Virginia.

Sixth Class National Ice Marketing Institute

Front of Table (Left to Right): Keith Miller, Crystal Ice Co., Lubbock, Tex.; Willard Adcox, Dalton Ice Co., Dalton, Ga.; Bill East, Ice Delivery Co., Greensboro, N. C.; Dave Denmead, Artesian Ice Co., Ft. Madison, Iowa; Ross Crim, Middletown Ice & Coal Co., Middletown, Ohio; Charles Shields, The Southland Corp., Dallas, Tex.; Frank McDermott, Southern New England Ice Co., Hartford, Conn.

Seated at Table (Left to Right): Richard C. Muckerman (Member of Department Committee) City Ice & Fuel Co., St. Louis, Mo.; Sam Sharp (class vice-president) Crystal Ice Co., Lubbock, Tex.; Jesse Fleener (class president) Ice Service, Inc., Evansville, Ind.; James Grubbs (class treasurer), Citizens Ice & Cold Storage Co., Columbus, Tex.; Daniel A. Prager, Director, Personnel Training & Marketing Dept., National Association of Ice Industries; J. C. Ruppert, Supt., National Ice Marketing Institute; Andy Andrich, Field Service Director, National Association of Ice Industries; Ed Feathers, Bristol Coal & Ice Co., Bristol, Va.

Standing (Left to Right): L. N. Fletcher, The Southland Corp., Ft. Worth, Tex.; Ike Greenberg, Purity Ice & Fuel, Toronto, Ont., Canada; Howard Essary, Southwest Service, Miami, Okla.; Perry Starkey, Southwest Service Co., El Dorado, Kans.; Paul H. Andres (Chairman of Department Committee), Southwest Ice & Dairy Products Co., Oklahoma City, Okla.; Alex S. Hill, Jr. (Member of Department Committee), Arkansas Ice & Storage Co., North Little Rock, Ark.; Mount Taylor, Executive Secretary, National Association of Ice Industries; Horace Moore, American Service Co., Atlanta, Ga.; Douglas Taggett (class secretary) Kalamazoo Ice & Fuel Co., Kalamazoo, Mich.; Clarence Pfender, Ice Service, Inc., Evansville, Ind.; Joe Granks, City Ice & Fuel Co., Pittsburgh, Pa.; B. A. Barrosse, Ice Service, Inc., Asheville, N. C.; Charles McCafferty, Big 10 Ice Companies, Richmond, Ky.; George Sherrod (Member of Charter Class), Greensboro Ice & Coal Co., Greensboro, N. C.

The seventh and largest class was completed March 18. Twenty-three men were enrolled in the class, known as the "Seventh Inning Club". The two-week course was concluded with a graduation dinner and the graduates were presented diplomas by Daniel A. Prager, Director of the Personnel Training and Marketing Department of the National Association.

John Causey (Class President), City Ice & Fuel Co. Miami, Fla., and Harlan McCoy (Vice President), Railways Ice Co., Memphis, Tenn., presided at the graduation ceremonies. Other officers of the "Seventh Inning Club" were Glenn Hill (Class Secretary), Consumers Ice & Fuel Co., New Castle, Indiana, and Kenneth Brown (Treasurer), The Southwest Service Co., Winfield, Kansas.

Seventh Class National Ice Marketing Institute

Seated (Left to Right): Lloyd Riggin, Railways Ice Co., Topeka, Kans.; Claude Daniels, City Ice Co., Topeka, Kans.; Harlan McCoy (class vice-president), Railways Ice Co., Memphis, Tenn.; Daniel A. Prager; John Causey (class president), City Ice & Fuel Co., Miami, Fla.; Al Yard, Railways Ice Co., Clovis, New Mex.; C. P. Austin, Instructor on Job Descriptions and Recruiting Employees; Charles Capito, Diamond Ice & Coal Co., Charleston, W. Va.; J. C. Ruppert, National Ice Marketing Institute; Ray Pillar, Instructor on Merchandising Ice Vegetable Displays; John Pope, Instructor on Handling Employee Relations; Loring F. Overman, Instructor on Merchandising Ice Beverage Chests; Joe Morris, Southland Corp., Waco, Tex.; Bill Chiles, Valley Ice Co., Hamilton, Ohio; Harold Boysen, Pueblo Ice Co., Pueblo, Colo.; Kenneth Brown (class treasurer), Southwest Service Co., Wichita, Kans.; Joe Dorrance, Rochester Ice Co., Rochester, N. Y.

Standing (Left to Right): Glenn Hill (class secretary), Consumers Ice & Fuel Co., New Castle, Ind.; Ed Davies, American Ice Co., Baltimore, Md.; Charles Howerton, Burlington Ice Delivery Co., Burlington, N. C.; L. C. Garth, The Southland Corp., Texarkana, Tex.; Jim Holmes, Kalamazoo Ice & Fuel Co., Kalamazoo, Mich.; Al Neher, Troy Ice & Coal Co., Troy, Ohio; Hazen Jonah, American Ice Co., Boston, Mass.; Floyd Riley, Southwest Ice & Dairy Products Co., Blackwell, Okla.; Paul Stauber, Polar Ice & Fuel Co., Indianapolis, Ind.; Al Griffee, City Ice Service Co., South Bend, Ind.; Devon Murphy, Home Service Ice Co., Marion, Ind.

The Institute has graduated 115 managers, district managers, local managers, assistant managers, delivery superintendents, route supervisors, and other executives in the first seven classes of operation. Texas and Indiana have led the enrollment in the Institute with 19 and 18 men respectively. Thirty other states and Canada have been represented.

National Ice Annual Report

THE annual report of National Ice & Cold Storage Co., San Francisco, Calif., shows that operations for the past year ended December 31, 1948, resulted in a net income of $303,041, equal to $28.62 a preferred share on which accumulations amounted to $196 a share at the year end. This compared with a net income of $596,134 or $56.35 a preferred share in the previous year. Balance sheet as of December 31 shows total assets of $1,276,040 including $589,527 cash and $200,000 United States Government securities. Total current liabilities were $304,594.

The refinancing plan filed with the state public utilities commission last December was withdrawn when opposition developed among some stockholders according to a report filed with the commission. The plan involved liquidation of accumulated dividends on the 10,586 shares of 7 per cent preferred outstanding through issuance of new shares.

Ice is Best Refrigerant for Fresh Produce Tests by Wholesale Grocer Show Why

By G. E. Pannkuk
Winston & Newell Co., Minneapolis, Minn.

A series of tests to determine better ways of displaying and merchandising fresh produce was conducted recently by Winston & Newell Co., Minneapolis, Minn. The tests covered a counter with an ice-bed rack, one refrigerated with mechanical refrigeration and one that was not refrigerated. Results of these tests show conclusively that sized ice is best for fresh produce because it does a better job at a more satisfactory cost. In the accompanying article, details of this test are discussed and valuable pointers are offered the ice industry on ways and means of extending this lucrative market.

OUR FIRM, Winston and Newell Company, operates a wholesale food organization that sponsors two groups of voluntary retail grocers. We spend most of our time thinking about ways and means to increase sales and profits for these dealers in order to maintain good sound customers. These stores, numbering 569, operate under the store names of Super Valu and U-Save.

This talk will be presented in two phases. First will cover the potential ice sales to be developed in the retail food field. The second phase will present our suggestions as to what the National Association of Ice Industries and their members can do to help food retailers and wholesalers. We understand the 1947 dollar sales of ice were $426,365,000. According to our experience in the use of ice in connection with retail displays of fresh fruits and vegetables, there is a potential additional business of $100,000,000 in ice or approximately a 25 per cent increase in your total annual business. Our figures are based on the following information.

In 1947 the total food bill in this country was 30 billion dollars. Of that, 5 billion was in fresh fruits and vegetables. According to our experience in one retail store for a 13-week period, starting February 7 through May 1, the cost of ice to total retail produce sales of $14,867 represented a cost of 1.1 per cent to produce sales. In another retail store during the hot weather period, June 7 to August 31, produce sales were $13,162, ice cost was $393.60 or 3 per cent of sales. Thus we believe that an ice cost of 2 per cent to retail sales value is a fair figure. When we speak of your potential increase of 25 per cent or 100 million dollars worth of business, perhaps you have already captured part of this business because your Association has been quite active.

The Ice Association is presented with a golden opportunity at this moment because retail food distributors are nearing the break even point. By break even point, we mean that point at which gross profits and expenses meet,

Paper presented at Annual Convention of National Association of Ice Industries.

THE conclusions drawn from the experiment referred to by Mr. Pannkuk in the accompanying article are shown in the following summary:

1—Iced produce minimizes weight losses (a) no more wilted looking produce (b) shrinkage saving from 3 to 5 per cent.

2—Cold temperature retains full vitamin content and flavor.

3—Investment low, capital free for fast-turning merchandise.

4—Sales appeal great: (a) Produce looks fresher, (b) Sprinkling of ice enhances nature's colors. We recommend iced produce beds plus an occasional top sprinkling of chipped ice and frequent sprinkling from the water bottle.

5—Sales potential is great. Many retail food stores have produce sales of 25 to 30 per cent of the total store sales. This is accomplished through good merchandising.

At various stages of the experiment, unbiased shoppers were called in for the sole purpose of getting their reaction as to which produce rack carried the most attraction so far as display, eye appeal, sales appeal, quality and condition of the merchandise were concerned. Some of the comments made by shoppers were: "Excellent quality and condition." "How fresh and crisp looking!" "Best produce I've seen!" "Very appealing and appetizing." These comments were made concerning the iced display. In connection with the uniced displays, customers said: "This is too wilted and discolored." "Not fit to eat." "My, what poor looking produce!"

In all experiments, fresh merchandise was used in the racks. Merchandise used was from the same original containers so as to eliminate any possible partiality of condition and quality for any one rack.

In reporting the results of these experiments and tests, Winston Newell gave also the actual results from the use of chipped ice in one of the retail Super Valu outlets in its Voluntary Group. This retailer installed 24 ft. of cork insulated bed in his produce department. Immediately after the installation of the iced bed, sales jumped to $1,000 to $1,050 per week from $750 per week prior to the transformation. Shrinkage and throwouts dropped from 4 to 6 per cent down to a low of 1 to 1½ per cent. And the net gross in the department, after shrinkages were deducted, has averaged 25 per cent for a 13-week period. Accurate records with weekly inventory are maintained by this retailer.

In addition to operating costs, a number of unseen savings were reported. One of the greatest of these was the saving of labor, since it is recommended that iced produce be left on the fixture overnight. If it is covered with a white sheet or piece of canvas, the produce temperature will actually lower during the night. This means that the produce need not be removed from the fixture, taken to the produce cooler, retrimmed in the morning and the display rebuilt. Thus there is a saving in labor, weight and shrinkage. Low temperature helps to maintain quality and condition of produce and an iced bed supplies moisture from below. Then, too, the handling and re-handling of produce is destructive. These unseen savings are actually dollar savings in operation of a produce department.

leaving no net profit. This trend has existed during the last two years. The Super Market Institute figures covering all members indicate net profits have declined to approximately ½ of what they were two years ago. We have a retail accounting department that keeps books for over 200 retail members. The average of these accounts indicate that gross profits have declined slightly, expense rates have risen and net profits are down. A reversal of this trend can be accomplished through merchandising long profit departments. The food distributing industry needs you because the fruit and vegetable department shows an average gross profit of 25 to 26 per cent, thus putting it in the top profit bracket. Ice will help sell more produce thus increasing retail distributors' profits.

on because they are always cold and fresh." Many comments of this kind are heard but time will not permit repeating more. Sales records prove to us that retailers can increase their volume of sales through iced produce displays.

Make Ice Available

A moment ago we mentioned that after proving to ourselves that iced produce displays were efficient and would build sales, we started a campaign of putting iced produce displays into all of our members' stores. This brings us up to the second phase of this presentation and that is our suggestions for what you can do to help us while increasing

TABLE I. SHOWING WEIGHT LOSSES OF VARIOUS PRODUCE ITEMS WITH DIFFERENT TYPES OF DISPLAY EQUIPMENT. FROM EXPERIMENT CONDUCTED BY WINSTON & NEWELL CO.

Type of Display Equipment	Dry Bed Not Sprinkled	Dry Bed Sprinkled	Refrigerated Not Sprinkled	Refrigerated Sprinkled	Iced Bed Not Sprinkled	Iced Bed Sprinkled
Total Amount of Weight Loss (%)	12.77	2.63	6.88	.68	2.91	67
Item	**% Weight Loss or Gain**	**% Weight Loss or Gain**	**% Weight Loss or Gain**	**% Weight Loss or Gain**	**% Weight Loss or Gain**	**% Weight Loss or Gain**
Head Lettuce	— 7.19	— 4.15	— 6.32	— 3.44	— 1.88	— .23
Spinach	.00	— 2.08	— 4.16	.00	— 4.16	.00
Cabbage	— 4.61	— 3.94	— 4.14	— 1.23	— .29	— .18
Carrots	—18.37	+ .46	— 9.13	— .94	— 2.19	— .21
Radishes	—17.11	— 1.62	— 8.71	— .29*	— 6.09	— .96
Celery	—12.27	— 2.98	— 5.68	— .26	+ .81	+ .27
Cauliflower	—12.18	— 4.11	— 7.18	— .79	— 5.75	— .18
Shallots	—21.62	— 6.41	— 8.86	— 1.38	— 1.11	— 1.33
Beets	—21.42				— .48	
Totals	—12.77	— 2.63	— 6.88	— .68	— 2.91	— .67

Legend:
—Indicates weight loss
+Indicates weight gain

*Frozen

Early this year we conducted some very exhaustive tests. Some of you are acquainted with the results of these tests which were published in our brochure, "When it's Cold, There's Gold." The Cook Publications, New York City, publishers of Voluntary Groups and Cooperative magazines, published the results of this test. The reason we conducted these tests was that we had listened to many discussions, heard a lot of theorizing and had conducted a few guessing contests of our own. We therefore resolved that in order to have the facts as to whether or not our 569 retail members should use mechanically refrigerated cases, iced produce equipment or use a common so-called dry rack and sprinkle the produce, we set up a series of tests. (Details and results are shown in the accompanying summary.) **The tests were so conclusive that iced produce was the way to sell fresh fruits and vegetables that we immediately embarked on a program of endeavoring to install iced produce display racks and island displays in every one of our members' stores.**

One important advantage in connection with iced produce display racks is a definite reduction of shrinkage. The saving in throw-out losses due to the use of ice is more than 2 per cent. Thus, a retailer can easily be convinced that the 2 per cent cost of ice is actually free because his savings in shrinkage losses will average 3 per cent.

Of greater importance is the sales appeal of good quality produce displayed in chipped ice. The comments heard from housewives during the tests we conducted, and since that time in retail stores where iced produce is displayed, convinced us that iced produce has lots of sales appeal. These are typical customer comments: "Super Valu fruits and vegetables are always fresh, nice and cold because they are iced," "Super Valu fruits and vegetables can be relied

your business. First, we found that ice was not available in many of the towns in which our member dealer stores are located. We operate warehouses at Des Moines; Aberdeen, South Dakota; Bismarck, Fargo and Minot, North Dakota; Duluth, Minnesota. Our home office and headquarters are in Minneapolis. Member dealers are located in all of the states mentioned and in addition, some in Eastern Montana and Western Wisconsin. We are seriously handicapped in the Dakotas and Montana, as ice is available only to approximately 20 per cent of our outlets in that territory. Perhaps similar conditions exist elsewhere.

Working as a team, the ice industry and the food traders can accomplish wonders. The use of ice will definitely increase sales of fresh fruits and vegetables. Except for the slight increase in cost of insulated fixtures over dry equipment, this increase in business will be free of cost to the food trades, because of the saving in throw outs.

We have found that the price of ice varies considerably, ranging from 40 cents per hundredweight to $1.00 per hundredweight. Perhaps there is a reason for this great range in price and the only reason we inject cost of ice into this discussion, is because we find a breaking point where ice ceases to be efficient for retailers' operation in connection with fruit and vegetable displays.

The trend in business today is large volume of sales at lower margins. Our company sells all merchandise, fruits and vegetables, meats and groceries at cost, assessing retail members only a service fee which covers procurement, warehousing, administration, supervision, advertising counsel and other services. We operate on a gross income of approximately 3 per cent on groceries and meats, 6 per cent on fruits and vegetables. This program was started in 1941. It has served to keep retail members in a competitive posi-

tion. Other groups in our market are now experiencing difficulty in maintaining their position.

You have an excellent start in advising consumers regarding the value of handling produce in ice because of greater freshness, the retention of vitamin content, etc. We would like to suggest that point of sale material be made available which can be used in those stores that have iced produce displays. Perhaps reprints of some of the ads or small leaflets which produce clerks can hand to consumers trading in iced produce departments. Consumers are interested in food preservation. Health articles in magazines and newspapers have made them conscious of freshness in foods and the importance of vitamins in the daily diet; thus you have a real message to give housewives.

Use of Insulated Blankets

During this past summer an experiment was conducted in one of our retail outlets with insulated blankets. It was found that the ice cost could be reduced considerably, particularly during extremely hot weather. At closing time, personnel in the produce department placed an extra layer of ice over the fruits and vegetables. The insulated blankets were placed on top of the ice. Inasmuch as the display equipment was insulated with two inches of cork board, the ice and produce was completely enclosed in insulating materials. The saving in ice overnight was considerable. At the same time the labor saving to the retail store was great.

Another experiment conducted in an attempt to put more "Sell" into iced produce was the installation of a two-way thermometer. This particular thermometer is designed to record inside and outside temperatures on one dial. One hand on the dial shows room temperature; a remote element placed outdoors records outdoor temperature with another hand on the dial. In this particular experiment we placed the remote element in the product on the iced vegetable display, not in the ice. It was our desire to record merchandise temperature. A special card was made, pointing out to consumers which hand recorded the product temperature and which hand, the room temperature. Product temperatures generally registered about 38 F, thus showing a wide difference as between product and room temperature. Comments heard from consumers were very favorable.

Perhaps the Association could be helpful in developing a special thermometer on which the product temperature could be recorded in cool green lettering, the room temperature in a contrasting color. Perhaps simple words on the face of the dial such as "Product Temperature" or "Food Temperature" immediately under the numerals showing product temperature. The words "Room Temperature" would be printed on the other part of the dial. Shoppers could quickly see that merchandise on that particular display was protected with low temperature. Additional assistance that might be furnished to retailers would be suggestions for means of storing chipped ice to reduce melting

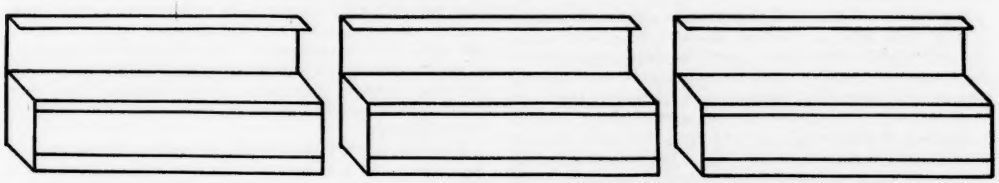


Fig. 1—Diagrammatic demonstration of cost of different types of display equipment used in Winston & Newell experiment. Left, dry bed not insulated $23 per ft.; Center, iced bed insulated $27 per ft.; Right, mechanically refrigerated, $129 per ft.

Ordinarily all merchandise would be removed from a retail display and placed in a refrigerator over night. This is not necessary when iced produce can be left on the display equipment over night. Another advantage lies in the fact that the display is ready for selling when the store opens the next day and with a minimum of effort.

As a result of this test, we ordered a small quantity of insulated blankets which were placed with all stores using iced produce displays. It is possible your association, through research work, can develop better insulated blankets, to be manufactured on a mass production basis, resulting in savings to retailers. Perhaps it is amiss here to talk about saving ice when you are interested in selling ice, but we assure you that you will interest more retailers in using ice in merchandising produce if you are able to point out to them that the actual cost of ice will be more than paid for with savings in throw-out losses.

TABLE II. RELATIVE OPERATING COSTS OF TYPES OF DISPLAY EQUIPMENT USED IN WINSTON & NEWELL EXPERIMENT.

Type of Fixture	Depreciation	Electricity Cost	Ice Cost	Interest at 6% on Investment	Total Weekly Cost
Mechanical Refrigerator	$5.00	$2.52**		$1.49	$9.01
Iced Bed with Cork	$1.04		$4.27*	.31	$5.62
Dry Bed Not Insulated	.89			.27	$1.16

*Ice is figured at 80¢ per cwt. (Minneapolis cost) which is a high rate. At Des Moines, Iowa, chipped ice costs only 42½¢ per cwt. This would make weekly operating cost of iced produce approximately $2.27.
**Electricity cost is computed on the basis of 4¢ per KWH which seems to be the average in Minneapolis.

loss. Dealers must buy a sufficient supply of ice to carry them 24 hours. This means surplus stock in the back room or refrigerator. Perhaps insulated containers would help hold down ice cost.

Ice Company has Prize Float

AT A recent stock show held in Delhi, La., the Delhi Ice & Fuel Co. won third prize for their float entered in the parade. On the float were included an ice refrigerator, ice chest and a crystal clear 300-lb. block of ice in which a huge fish had been frozen. An attractive part of the display were the two grandchildren of Ernest B. Arender, manager, who rode their rocking horses with great gusto and spirit in the attached corral.

Canadian Ice Prices Increased

A FEW more cents a week were added on April 1 to the budget of housewives who use ice when ice companies in Toronto, Canada, raised their prices by one cent for a 25-pound block. The increase brings the price of ice to the consumer to 15 cents for 25 pounds, or 30 cents for a 50-lb. block. T. G. Rogers, secretary of the Lake Simcoe Ice & Fuel, said this first increase in eight or nine years was made necessary by rising costs and that only a growing volume of sales each year have kept the prices from going up in the past few years.

Picketing Ice Plant to Stop Sales to Non-Union Peddlers Held Illegal

IN A unanimous decision, the United States Supreme Court upheld the power of a State to prevent union picketing of an ice plant to stop the sale of ice to non-union peddlers. The decision was written by Justice Black, one of the most advanced liberals of the Court. In the decision he stated that the labor union men were attempting to compel the ice plant to abide by union rather than state regulation of trade.

The Missouri law forbids any person combining to restrain trade in commodities within the state. Acting under this law, Missouri courts issued an injunction restraining union men from picketing the Empire Storage & Ice Co with placards opposing sale to the non-union peddlers.

The case arose when the Ice and Coal Drivers and Handlers Local Union, A. F. L. of Kansas City, Mo., tried to get non-union peddlers to join their union. Most of them refused. The union then obtained an agreement from all wholesale ice distributors except Empire not to sell to non-union peddlers. In the next step, the union picketed Empire with placards and the ice corporation fought back in the courts.

The trial court, later sustained by the State Supreme Court, found that the union was using a combination to make Empire stop selling to the non-union men and that the picketing was "to force Empire to become a party to such combination."

The opinion of the U. S. Supreme Court said, in part:

"The basic issue is whether Missouri or a labor union has paramount constitutional power to regulate and govern the manner in which certain trade practices shall be carried on in Kansas City. Missouri has by statute regulated trade one way. The appellant union members have adopted a program to regulate it another way. We hold that the state's power to govern in this field is paramount, and that nothing in the constitutional guarantees of speech or press compels a state to apply or not to apply its anti-trade restraint law to groups of workers, business men or others.

The picketing, the Supreme Court agreed, was "done in violation of Missouri's valid law for the sole immediate purpose of continuing a violation of law." The union had emphasized the peaceful nature of the picketing, but Justice Black declared that "placards used as an essential and inseparable part of a grave offense against an important public law cannot immunize that unlawful conduct from state control."

Annual Report American Ice Company

THE annual report of the American Ice Company of New York City for last year showed a slight reduction in net income to $555,920 which, after preferred dividend requirements, was equal to 98 cents a share on common stock. A dividend of 60 cents was paid on the common stock January 4 this year, the same amount as a year ago.

Mild weather this winter has retarded fuel sales but has had a tendency to benefit ice volume, which is the main source of the company's income. January operations resulted in a loss but it is understood to have been less than last year. Early months of the year are seasonally thin from an earnings standpoint. The third quarter produces the major portion of the company's annual profit.

The company expanded its business last year through the acquisition of additional ice plant facilities in eastern seaboard cities in which it operates. The purchase involves an expenditure of approximately $625,000, of which $259,004 will be met in deferred payments in installments over a five-year period after 1949.

City Ice & Fuel Sales Increase

NET SALES of The City Ice & Fuel Co., Chicago, for 1948 reached the highest peak in the history of the company, the total being $78,508,500, an increase of $8,045,700 over 1947, according to an announcement by Wm. J. Sinek, president.

Sales of the company have shown a continued steady increase over the last eight years. Sales in 1940 amounted to $25,688,400. This increase in sales is largely the result of the extensive diversification and expansion program which the company entered into several years ago. The 1948 annual report, mailed to the stockholders, is the company's 55th annual report.

At the close of the year cash and government securities amounted to $9,027,960 in addition to $1,951,600 of U. S. Treasury Savings Notes, Series C & D. Current assets were $20,484,175, current liabilities $8,357,188, and working capital $12,126,987.

Net profit after allowing for $4,091,340 depreciation and $3,755,000 for federal taxes was $5,705,947, compared to $6,067,466 in the preceding year. The net profit per share was $4.52, as compared with $4.81 per share in 1947. Cash dividends of $2.50 per share were paid on the common continuing the company's unbroken dividend record of 55 years.

By reason of the extensive diversification that has taken place in the company's business, the change in the company name, which has been unanimously approved by the directors will be a matter to be voted upon by the stockholders at the Annual Meeting in April. Upon approval, the name will be changed to "City Products Corporation," a name which more adequately describes the present diversified business operations of the company. The company expects to continue its past expansion and diversification program.

The company's varied products are now manufactured, distributed and sold and its many activities conducted in 300 cities and communities located throughout the United States, Canada and Mexico. This diversity of products in widely scattered markets becomes an increasingly important element in the strength and stability of the company's business, the company being no longer dependent on the sales or profit of any one product or any one market.

Mr. Sinek further reported the company's plants and equipment are being maintained and kept at the highest standard of efficiency, substantial expenditures having been made during the year for maintenance and repairs.

Udden Buys Ice Plants

THE ice plants at Pleasanton and Falfurrias, Tex., formerly owned by The Central Power and Light Co., Corpus Christi, Tex., have been purchased by S. M. Udden who has been general superintendent in charge of ice operations for Central Power & Light. Mr. Udden took these plants over on April 1 and will operate them under the name of Udden Ice Service. His place with the company has been filled by E. W. Franke, of the home office executive department.

Radio Plug for Ice

A GOOD publicity plug for the ice industry took place on the Mutual broadcast radio program "Queen For a Day," Tuesday, March 22. Among the awards at the show was a "perfect combination," a new ice refrigerator and a home freezer. Entertainment plans for the convention of the California Association of Ice Industries included attendance at this broadcast. The broadcast originated in Hollywood, Calif., at 11 a.m. Pacific Coast time and was carried on a nation-wide network of 500 stations.

Florida Short Course on Ice Manufacturing Draws Big Enrollment

Florida's first short course for ice manufacturers drew this group to the University of Florida, March 14-16 for three full days of study under outstanding authorities in engineering, water chemistry, maintenance of plant and equipment, lubrication, safety and owner-manager-employe relationships. Florida Ice Association sponsored the course which was conducted by the General Extension Divison.

A SHORT course on ice manufacturing was given at Gainesville, Fla. March 14, 15 and 16 by the General Extension Division under the sponsorship of the Florida Ice Association. This was the first such course offered in Florida and the response indicated by 84 enrollments was very pleasing to the sponsors.

It was the culmination of several years of thought and study on the part of leaders of the Florida Ice Association. Active planning was begun about a year ago with University of Florida officials who have had experience in conducting extension training programs for various business and professional groups in the state.

The first step after the proposal for a course was approved by the association was the appointment of a program committee to work with University extension, engineering, and science authorities in planning the course content, working out schedules, obtaining outstanding specialists from the ranks of educators and the trade and attending to other details such as publicity.

Several meetings of the committee with University leaders resulted in the adoption of a program, drawing on the faculties of the colleges of engineering and arts and

Administrative and teaching staff of Florida Short Course on Ice Manufacturing. (Front row) C. T. Baker, Atlanta, G. M. Turner, course coordinator; F. M. Pumphrey, program committee chairman; A. P. Black, University of Florida hydrologist; B. C. Riley, General Extension Division; Herbert R. Beers, Florida Ice Association president; C. J. Quinn, industrial chemist; Miss Muriel Washburn, secretary, Florida Ice Association. (Rear row) B. W. Murray, Sinclair Refining Co.; H. F. Cramer, City Ice & Fuel Co.; E. J. Hill, Middle Florida Ice Co.; Tallahassee; Newton G. Ebaugh, University of Florida.

F. M. Pumphrey (extreme left), vice president of the Florida Ice Association, and Dr. A. P. Black (seated), University of Florida hydrologist and president of the American Water Works Association, with a group of students at the first short course on Ice Manufacturing held March 14-16 at the University of Florida pictured during a break between sessions. The enrollment of 84 represented a cross section of the ice industry, from plant owners to office and plant operating employes.

sciences of the University, outstanding members of the manufacturing group, and trade suppliers. Among University of Florida authorities were Dr. A. P. Black, widely-known consulting hydrologist who is president of the American Water Works Association and has been for 30 years a member of the chemistry faculty, Newton C. Ebaugh, refrigeration consultant who is a member of the engineering faculty. Both Mr. Ebaugh and Dr. Black gave generously of their time in various pre-course planning conferences, also.

From the ranks of the manufacturers came Herbert R. Beers of St. Petersburg, president of the Florida Ice Association; W. M. Bostwick, for many years a plant engineer, now conducting research and industrial engineering work for the Florida Power and Light Corporation; H. F. Cramer, chief engineer of the Florida operation of City Ice & Fuel Co.; E. J. Hill, chief engineer for the Middle Florida Ice Co. of Tallahassee; F. M. Pumphrey, district manager, City Ice & Fuel Co., Daytona Beach, who is also chairman of the program committee.

Drawn from trade suppliers and professional consultants were C. J. Quinn, of Mathieson Alkali Works; Charles J. DeWitt, safety engineer, Liberty Mutual Insurance Co.; B. W. Murray, lubricating engineer, Sinclair Refining Co.; C. T. Baker, Atlanta consulting engineer; Charles Black and associates of Gainesville's Black Laboratories.

Future Plans

The course is the foundation of the association's educational program which will be expanded in years to come. Regarded as a pilot project, the response was such, both from the standpoint of attendance and from the interest and enthusiasm exhibited throughout, that there is every indication the course will be an annual affair, the focal point of a year's work which it is expected will include correspondence study, regional and district conferences, as well as company and plant training.

"We approached this training program from the point of view that ice manufacturers have a public responsibility," Mr. Pumphrey commented. "We are aware that further progress within the industry is essential, not only to the success of ice manufacturers, but to the fulfillment of their public responsibility. The war and its aftermath caused extensive changes in personnel, with the result that nearly all plants have been faced with an almost insurmountable problem of training new men while trying to maintain plant efficiency and service.

"The logical answer seemed to be a school, but this appeared to us to be too great an undertaking for the industry. Then it occurred to us that Florida's General Extension, representing the two state maintained universities, which had conducted courses and schools for many business and professional groups within the State might be able to help. This is the result. I believe that any group of manufacturers can accomplish the same type of program if they will take their problem to their institutions of higher learning."

Large Enrollment Pleasing

That the industry will support such a program is clear. In the planning stage, it was felt that the short course would draw between 35 and 50 students. Both the association and the General Extension Division were greatly pleased when the enrollment reached 84. In addition, comments have been uniformly encouraging. At the concluding session of the course, students unanimously recommended that the association plan for an annual short course, augmented by other training work as fast as plans could be developed.

Among the subjects studied were plant housekeeping, lubrication, care and maintenance of machinery, water supply and its treatment, handling brine, behavior of refrigerants, plant safety, owner-manager-employee relationships and evaporating and condensing surfaces.

While many subjects were not treated at all, or only briefly, this was because of the limitations of time. Those which were gone into in detail were the ones which seemed most pressing to the industry in Florida.

Icing Vegetables on the Farm—Produce Growers are Told its Advantages

TO INTEREST truck farmers in the use of ice for their vegetables, a luncheon meeting was held at LaPorte, Ind., March 31 by the Barnes Ice & Fuel Co. of Gary and the City Ice Service, Inc., South Bend, Ind. Luncheon was served at the K of C Hall. Representative truck farmers from the region, city health officials, representatives of the National Association of Ice Industries and home economics teachers were present.

The National ice film "Naturally Yours" was shown, after which B. H. Landing of The Barnes Company told why ice should be used for fresh vegetables,—that it reduces loss from spoilage, keeps them in better condition, brings better prices and increases sales. This is especially important to the growers, he pointed out.

Harold Schlenz, a produce retailer and wholesaler of Gary gave a short talk, pointing to the large market for home grown produce in that immediate vicinity. This home grown produce he said has a big competitive advantage over California produce, but it must be packed and preserved by pre-cooling and use of crushed ice. Mr. Schlenz recently installed a 30-ft. vegetable icing counter in his store and is highly delighted with the results.

Another very interesting talk was given by one of the Bernicki Brothers who operate a truck farm near La Porte. The farm is eight miles from the packing house where the vegetables are pre-cooled by washing in well water which is about 50 F. and then packed in crushed ice. The cost of ice is very nominal but they have found that it has eliminated all spoilage and enables them to deliver the produce to their markets, including the Chicago market, in prime condition. The use of ice all adds up, he concluded, to making it possible to deliver a higher quality product, getting a better price, increased volume with greatly reduced spoilage and no complaints as to quality.

David J. Copeland, Chairman of the Research Division of the National Association of Ice Industries told briefly about the research work being done by a number of universities on vegetable icing, all of which show better results in retention of vitamins, freshness and high quality.

Ice Plant Adds Frozen Food Storage

A NEW addition is being erected at the plant of the Sanger Ice & Cold Storage Co. in Sanger, Calif., at a cost of $80,000, to increase the freezing capacity from 50 to 70 tons of ice each day. The new structure will include a subzero storage room and storage building of completely modern construction to provide space for more than 4,000 lbs. of frozen foods and room for storage of 30 cars of fruit at a temperature of 32 F., it was said by Leslie C. Blue and E. L. Barry, owners of the company. The ice plant, originally built in 1940 by Ted Blue, was expanded in 1946 to provide for the present storage rooms. The new storage rooms will be completed about July 1.

Reports From Unit Ice Associations

Eastern States Ice Association Annual Convention

THE 17th annual convention of the Eastern States Ice Association was held at the Hotel Haddon Hall, Atlantic City, N. J., March 31, April 1. The number of registrations was the largest since 1946 and the same applies to the number of exhibitors. It was a real icemans convention and the enthusiasm and interest displayed by all those present was inspiring to the officers and the program committee.

A speech by George Steers was a warm-up volley fired at the first session. All who heard his talk received enough ideas and advice to convince them that the ice business is far from dead if they will put some real energy into it and carry out the ideas and suggestions made by Mr. Steers. He received tremendous applause.

Mount Taylor was present and gave one of his usual informative talks and brought the members up to date on affairs in Washington including the bills before Congress detrimental to the ice industry as well as all other industry. He told of the fight being carried on by the National Association against this legislation.

An interesing and informative paper on how to economize in plant operation was presented by Robert T. Brizzolara of New York City. Mr. Brizzolara's paper will be published in ICE AND REFRIGERATION. The other papers and the panel presentation and open forum were of the same high type.

The dinner-dance and entertainment Thursday evening was a most delightful occasion enjoyed by everyone.

Officers Elected

Officers were elected as follows:
President, H. Stewart Dunn, Pittsburgh, Pa.
Vice-President, Geo. M. Currie, Poughkeepsie, N. Y.
Vice-President, James B. Post, Wilkes-Barre, Pa.
Vice-President, Samuel H. French, Philadelphia, Pa.
Secretary-treasurer, Samuel Freer, Philadelphia, Pa.

North Carolina Ice Association 40th Annual Convention

APPROXIMATELY 150 members and guests attended the 40th annual convention of the North Carolina Ice Association held at the Sheraton Hotel, High Point, N. C., Monday and Tuesday, March 7 and 8.

Feature of the convention was a demonstration of modern produce icing given by Andy Andrich, field representative of the National Association of Ice Industries. Grocerymen from High Point and nearby towns and other visitors interested in the vegetable business were present to see this demonstration.

Manufacturers and distributors of ice-using machinery and ice-using equipment had extensive displays which were of interest to the visiting ice distributors.

President R. V. Sisk of Charlotte presided at the opening session Monday morning at which time new officers were elected for the coming year. Highlight of the first day's program was an address by Robert L. Thompson, editor of the High Point Enterprise.

Observations and panel discussions were held Monday afternoon with Mount Taylor, executive secretary of the National Association of Ice Industries reporting on the work and future program of the National Association.

An interesting panel discussion on merchandising processed ice was conducted by E. L. Gunn, Atlanta, Ga., Walter Dobbins, Greenville, S. C., J. Henry McGill, Charlotte, N. C., and Ray F. Butler, Richmond, Va.

Others on the program Monday included L. G. Gore, president of the Carteret Ice & Coal Co., Moorehead City, who spoke on, "Does the Fisherman Help to Ring Your Cash Register?"

The annual banquet was held Monday evening followed by entertainment with Pat Taylor at the microphone with "Fun for Everybody" by Bill Bear, humorist, of Atlanta, Ga. The event was climaxed with the annual dance. Entertainment for the ladies included a luncheon, a tour through Tomlinson's furniture exhibit and a tour of the Adams-Millis plant, makers of nylon hosiery.

Tuesday's session included a film on water by the American Cyanamid Co., New York City. Chas. C. Williams, manager of the Truck Dept. of Sanders Motor Co. of Raleigh, N. C., talked on Truck Operations. R. M. Tarrant, manager of the Personnel and Public Relations Dept., North Carolina division, Standard Oil Co., Charlotte, N. C., talked on Selection and Training of Employees.

At the annual luncheon, over which George Sherrod, chairman of the executive committee, presided, an address was given on "What's Going On" by J. B. Mahoney, president of the Southern Ice Co., Charleston, S. C.

Officers Elected

The following officers and directors were elected:
President, W. Harold Sherrill, Hickory
Vice-president, D. M. Howell, Greensboro
Secretary-treasurer, Lewis H. Powell, Raleigh
Executive Committee: R. V. Sisk, chairman, Charlotte; L. G. Geddie, Mount Olive; W. S. Goodson, Reisville; E. J. Jeffress, Goldsboro; E. L. Lowie, Gatonia; J. H. McGill, Charlotte; G. S. Sherrod, Greensboro.

Mountain States Association of Ice Industries-Annual Meeting

THE 32nd annual convention of the Mountain States Association of Ice Industries held at the Antlers Hotel, Colorado Springs, Colo., March 24, 25 and 26, 1949, proved to be the most successful convention held in many years.

The program started off Thursday evening with a get acquainted party, cocktails and buffet dinner. Friday morning on roll call there were about 60 present. The President's report summarized the general trend of the ice business over the last several years with analysis of why the extra drop in tonnage in this territory due to crop conditions and with the thought that the approaching season would more than make up for the drop in 1948.

Van J. Sparks, western representative for the Frick Co., gave a very interesting talk illustrated with slides on "One Man Ice Plants" and recent refrigeration developments. Mr. Sparks knows his subject, is an ice plant operator and right up to the minute on the latest developments in refrigeration. Slides were shown on the new orange juice freezing process.

Friday afternoon all hands boarded limousines and visited the famous points of interest around Colorado Springs, —Van Briggle Pottery, Garden of the Gods, Williams Canyon, Cave of the Winds, Manitou, Corley Highway, Cheyenne Mountain Zoo, Will Rogers Shrine, returning about five o'clock in the evening. Friday evening the annual banquet was held at the Broadmoor Hotel.

Saturday morning, March 26 was given over to an Engineers' Panel Discussion, L. L. Belcher, Mountain Ice and Coal Co., Pueblo, Colo., moderator. Saturday afternoon another panel discussion covered "Sales and Service" with Walter T. Elliott, Albuquerque Ice Co., Albuquerque, N. M. as moderator. Both of these sessions proved to be very interesting and everyone who attended carried away many good thoughts .

Officers and Directors

Officers and directors were elected as follows:
President, D. E. Woodson, Cheyenne, Wyo.
Vice-president, Walter T. Elliott, Albuquerque, N. Mex.
Secretary-treasurer, J. Reimer Espy, Denver, Colo.
Regional President, L. L. Belcher, Pueblo, Colo.
Directors: Clarence H. Adams, Denver, Colo.; A. M. Yard, Clovis, N. Mex.; Henry Nadorf, Denver, Colo.; Dave Bier, Greeley, Colo.; P. S. Goan, Billings, Mont.; Lee P. Strain, La Junta, Colo.; George A. Allebrand, Colorado Springs, Colo.; Frank Adams, Denver, Colo.

Canadian Association of Ice Industries Annual Convention

THE annual convention of the Canadian Association of Ice Industries was held at the Hotel Vancouver, Vancouver, British Columbia, Canada's third largest city, March 7, 8 and 9. While the relatively small registration from eastern Canada was a bit disappointing, the correspondingly heavy British Columbian registration made a most impressive gathering.

Starting with a cocktail party on the evening of March 7 at which British Columbia ice dealers were hosts and continuing through the President's dinner and dance on the closing evening, the program proceeded smoothly.

Officers Elected

To serve as the new president, Leslie Wilkins of Stratford, Ont., was elected. Mr. Wilkins has served as vice-president and chairman of the refrigerator committee for the past two years and has been an energetic association worker for many years. He is now owner and manager of the Wilkins Frosted Food and Ice Co., Stratford, Ont. For vice-president, Cecil W. Goodrich, Garvin Ice & Fuel, Ltd., Vancouver, B.C., was elected and John Dade of Toronto was re-elected treasurer. Three new directors were elected as follows: J. Grassick, Regina, Sask.; A. Crowe, Truro, N.S.; and I. Greenberg, Toronto.

A worthwhile contribution to the convention discussion was a recommendation by J. K. Davidson of Portland, Ore., that all sized ice be sold by the bushel and not by the pound. Mr. Davidson pointed out that the so-called 50 lb. paper bag is really a bushel bag. When the bag is filled with large sized crushed ice, a bushel measure is there but the weight is several pounds under 50 lbs. When the bag is filled with medium sized ice, the bushel measure is still there and the weight is around 50 lbs., but when snow ice is packed, the weight is more than 50 lbs.

Various methods for keeping the bottom of ice blocks clean in a truck, speeding up handling of ice and, at the same time, reducing the breakage of ice on the truck were discussed. It was recommended that all loading platforms be equipped with hose and water to flush the inside of truck bodies between every load.

During the discussion on route foremen, it was brought out that they are becoming an indispensable cog in every smooth working ice delivery organization. The general practice is to have one to eight routes, with full responsibility for proper functioning of each route.

Illinois Association of Ice Industries

A MEETING of the officers and directors of the Illinois Association of Ice Industries and the Illinois Ice Merchandising Council was held at the St. Nicholas Hotel, Springfield, Ill., Friday, March 11. At this meeting the Illinois Association approved of a plan formulated by D. A. Prager, Director of Marketing and Personnel Training Institute of the National Association of Ice Industries to form a National Ice Merchandising Council for the purpose of collecting and disseminating information on all phases of merchandising. Illinois has already taken the first step in the plan by the formation of the Illinois Ice Merchandising Council

An engineering conference was held at the Emmerson Hotel, Mt. Vernon, Ill., starting at 12 noon Thursday, April 14, sponsored by the Engineers Committee of the Illinois Association of Ice Industries.

Illinois Managers Conference

THE attendance at the Illinois Managers Conference held at the Park Hotel, Beardstown, Ill. April 6 was excellent, all sections of the state being represented.

This meeting was held in Beardstown on invitation of John H. Glenn who proved to be a genial host and did everything possible to make the day pleasant, including a catfish dinner for everyone attending both the management conference and the merchandising conference. The visitors arrived early and were personally conducted through John's locker and processing plant where on that day nearly 1,000 broilers were being processed. Ice was used at every step in the processing.

The tour then went to the ice plant, frozen food warehouse, show room and business office on Main St. and enroute passed by numerous other businesses which John is conducting during his spare time.

The business session was held immediately following the dinner. One of the high spots of the program was a report given by D. T. Denmead, Artesian Ice Co., Ft. Madison, Iowa, who recently graduated from the Ice Marketing Institute conducted by the National Association. He is very enthusiastic and was successful in impressing those in attendance with the necessity and desirability of enrolling their top men in the course.

Delta States Spring Meetings

AT the meeting of the Board of Directors of the Delta States Ice Association held in January, it was decided to set up Merchandising Forums in each of the three states covered by the Association.

State-wide meetings were held at Little Rock, Ark., and Alexandria, La. Mississippi preferred two meetings, one at Hattiesburg and the other at Winona. The morning hours, in each case, were devoted to panel and round table discussions on sized ice, cubed ice, vegetable icing, sales of ice using equipment, vending machines, icing of mechanical meat cases, etc.

Unusual enthusiasm was manifest at every meeting, with the unanimous decision that they were very much worth while and should be continued. Daniel A. Prager, Director, Merchandising and Personnel Training Department of the National Association of Ice Industries, was present at each meeting. During each afternoon session Mr. Prager gave a realistic presentation of the aims and possibilities of the Merchandising Forum.

Arkansas, Louisiana and Mississippi are now all in the process of organizing their individual Merchandising Forums, with Mississippi's first meeting at Allison's Wells on May 9.

The Practical Refrigerating Engineer

Reg. U. S. Patent Office

OPERATING • MAINTENANCE • NEWS
QUESTIONS AND ANSWERS

National Association
Practical
Refrigerating Engineers

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Executive Offices:
435 North Waller Ave.
Chicago 44, Ill.

Effective Methods in Accident Prevention

By D. A. Laird

Assistant Vice President
Southern Division, The Borden Co., Houston

I WAS agreeably surprised to learn, from your Secretary, that a group of operating engineers would devote a portion of the time on your busy program to the subject of Safety.

Part of my surprise comes from an early impression that a good operating engineer was judged more by the number of fingers he had lost, than by his other qualifications.

It was for that reason that I accepted his invitation to explain the Safety program used by our company in its operations.

Our program can be broken down into four activities:

1. Automotive accidents
2. Personal Injury accidents
3. Good Housekeeping
4. Fire prevention.

We are sure that, for the discussion today, you will be more interested in the latter three portions of the program.

As it takes time and costs money to hold meetings of any nature, the effort expended on Safety should not only result in the reduction of accidents, with their high costs, but should materially improve operating efficiency by the elimination of improper work practices.

To begin with, any program which we institute, to be successful, must have the support of our employees and the backing of top management. *We must, in short, have a clear cut Safety policy.* Support from fellow employees usually follows a sound Safety policy when it is clearly understood and backed by a program of education. Backing from management can only come through a desire to prevent accidents and a humane interest in the protection of employees while at work, the saving of lives, limbs, and property, as well as a reduction in operating costs.

Given the two above factors, we set up a Safety Council at each plant or branch location, composed of a Chairman and a representative of each major department of that operation. Changes in personnel of the Committee should be made at intervals, so as to keep the Committee alive and give as many employees as possible an opportunity to serve.

Presented at the 39th Annual Convention, NAPRE.

It is the duty of the Committee to see that all new employees are properly trained in safe practices—the foreman or leader in each department actually doing the work, with the Committee making recommendations, if needed.

The Committee should recognize good Safety performance and keep management informed of recommendations or suggestions from employees. It should conduct educational meetings for employees, through the liberal use of films, leaflets, talks, and posters on bulletin boards.

Two safety posters from a group produced by the National Safety Council for use by the dairy industry.

Under education, films seem to be one of the better ways of getting the message over. They are available from several sources. The National Safety Council has a large library that can be rented or borrowed. Most large industrial employers have several and are glad to loan them out. Your own local Safety Association usually can supply material or speakers.

Safety Committee Meetings are held at least one each month, usually the first order of business being to rate or grade accidents that have occurred during the preceding calendar month. The rating follows clearly those of the National Safety Council, *first*, in order that any statistics we gather will be comparable with others in our business, in our communities and in our Company.

Secondly, we use the National Safety Council ratings in order that our fellow employees will know that they were not designed to place the blame on him or her, but are intended to place responsibility fairly, in order to point out unsafe work practices. Sometimes, gentlemen, our

faces are plenty red when a rating indicates company responsibility. It often happens.

After having established responsibility, the Committee mails a short letter to the employee's home, with a recommendation for prevention. If the accident was of a serious nature, you can express sympathy—you are looking forward to his return to work, or you are glad he was not hurt more seriously. He and his family appreciate it.

In the case of an automobile accident, where he was held blameless, he can be congratulated for his skill in driving —a pat on the back, if you please—we all like it, don't we?

Let me say a word on a pet peeve of mine—it's bulletin boards. They don't have to be big, but should be neat and with only one or two posters or notices on them. They should be placed at points where they will have "high reader exposure". They should be changed at regular intervals in order to keep the message fresh, in order to keep the "reader exposure high".

MILK DELIVERYMEN
(Protection of the Public)
1. Report any accident or property damage, no matter how trivial it may seem.
2. Park your vehicle correctly. Be sure it cannot roll.
3. Watch carefully for children. Never let them ride with you or "hitch ride."
4. Walk, don't run. Keep to the right when rounding corners.
5. Deliver milk bottles so they cannot cause anyone to stumble.
6. Clean up spilled milk and broken glass promptly. Wear gloves and place the broken glass in a special container.
SAFETY INSTRUCTION CARD No. 676
DELIVERY VEHICLE OPERATION
1. Keep your vehicle to the right and out of car tracks. Avoid heavy traffic.
2. Stop at the curb if you can. See that no part of your vehicle extends into the traffic lane.
3. Give proper hand signals when making turns. Be sure all lights and lantern are plainly visible during fog and darkness.
4. Keep your vehicle under control. Anticipate emergencies and think for the other driver.
5. Raise and secure tail gate if not in use.
6. Concentrate on your driving. Pull to the side and stop if you must make book entries en route.
Be sure everything is clear before backing. Watch for children.
SAFETY INSTRUCTION CARD No. 677

Typical safety instruction cards which companies secure from the National Safety Council to give information to workers and instruct them in safe procedures.

Someone in our company recently put out a pamphlet called "The Care and Feeding of Bulletin Boards", which says, in part, that location has a lot to do with how many people see them—near time clocks, water fountains, dressing rooms, docks, hallways, or in the make-up rooms seem to be some of the better places to get "high reader exposure".

Awards

In large organizations, such as ours, it is difficult to arrive at a equitable award plan for the safe worker, for it has been found that less than 8 per cent of our employees have a majority of the accidents. A button award plan loses the offenders too quickly. They get lost in the crowd. Up to now, we have used only a pocketbook or card case size card, which signifies extended safe working time.

It is properly endorsed with signatures and while it won't keep the motorcycle officer from giving you a speeding ticket, it at least gives you something to talk to him about.

On safe driver awards, we use a safe driver button award system—starting with one year's service without a preventable accident, then a new button each year of safe driving, until he has attained 15 years continuous safe driving at which time he is presented with a fine pocket watch, which has been properly engraved. In our Southern Division this last year, we had nine men to qualify for watches. We are proud of them and their record.

Good Housekeeping

Good housekeeping is a companion activity to Safety. We operate here, too, on a committee basis—usually three people on the committee, two men and a woman secretary, who go through our premises, usually while we are in operation, for that's when other people, our customers and visitors, see us. In our case, we make a written report of exceptions found, which is given to each department head for correction.

We have tried both the score card and exception method of reporting and lean to the exception method, as it points out definite defects and can be used as a work sheet on making corrections.

Does it work? You bet your boots! We men sometimes don't find things like the woman secretary will.

How does it tie into safety? Our experience has proven that generally an employee who is a good housekeeper, by instinct or training, is a safe worker—or expressed another way, when he is working under good housekeeping conditions, his chances of working safely are better. Good housekeeping pays dividends in more production per man hour and in keeping quality standards high.

An effective bulletin board should be neat, attractive and well maintained and should be located where it will attract the most attention.

In a storage company, which we operate, here are some of the questions the Committee asks on their rounds:

1. Are floors clean and free of dirt and strips?
2. Are stocks of merchandise orderly?
3. Are walls clean and properly whitewashed?
4. Coils free of ice?
5. Doors painted and in good repair?
6. Vestibules clean?
7. Elevators and pits clean?
8. Restrooms clean and lockers orderly?
9. Are docks, ramps, and landings clean?
10. Outside premises clean?

Here in the storage, we combine both the exception and score card method of reporting. We find Saturday afternoons, during rush seasons, an excellent time to get thoroughly caught up with good housekeeping recommendations.

We have still another Committee, headed usually by the Chief Engineer, and including the Chairman of the Safety Committee, who makes the rounds of the premises once each month, looking for fire and safety hazards. This

Committee is a little on the technical side and deals with placing and maintaining fire extinguishers and equipment, electrical equipment, fire doors, pressure vessels—are they drained of water and oil, guards on equipment, first aid equipment, axes in hardening rooms to let the man out, in case he's locked in?

To sum up our experience for last year on personal injury accidents, we find that the injured employee was a male, married, between 21 and 25 years old. He had been in our employ less than 5 years. The accident happened inside the plant. June was more than likely the month, and sometime between the 1st and the 10th. The day of the week was Monday—the hour between 9 and 11 a.m. The accident was due to handling objects in which either his hands or back was injured—either a cut, bruise, or a sprain. The cause of the accident was "haste" or not being sufficiently alert. He was off duty one and one-half days.

Safety must be brought down to the level of our employees. They must have an interest in it—a purely selfish interest of their own welfare to make it work. Salesmanship must replace preaching, if we are to get the job done.

N.A.P.R.E. Question Box

NOTE: H. G. Venemann, Chairman of the Educational Committee, has agreed to answer through this column all questions asked by members of the N.A.P.R.E. Please send your questions to him care of Purdue University, West Lafayette Ind.

Predrying Freon System

Question No. 808: What is the best method for positive removal of moisture from coils and connections in a refrigerating system before charging Freon into it?—A.C.L.

ANSWER: I understand that the evaporator and condenser coils for small household and commercial units are often baked at the factory to remove the moisture after which the ends are sealed to prevent its re-entrance. This would be impracticable with large coils used in industrial systems. For that reason little is done to remove the moisture before charging Freon into the system. All manufacturers of Freon compressors recommend that their systems be provided with a Freon dryer. Those using silica gel or activated alumina are said to give the best results. The dryer is usually installed in a liquid line by-pass and the Freon circulated through it for a period of about 12 hours, after which the dryer is removed from the line.

If the drying material shows evidence of being saturated with water or water vapor, a new charge should be used or the old charge dehydrated by heat and the operation repeated. Driers of the activated alumina type should be bypassed or removed after the coils have been dried thoroughly to prevent the white powder from going through the system, causing trouble. This white powder represents drying material which has slacked out. It will pass through liquid strainers, and will accumulate into a putty-like mass at the expansion valves.

If hot compressed air is available it could be blown through the system and discharged at conveniently located low points. This would tend to rid the pipes of scale, or other foreign matter including the moisture.—H. G. Venemann.

Operation Above Critical Pressure

Question No. 809: I have read and studied your book, Refrigeration Theory and Application and am now an apprentice in the refrigeration field. A question has come up concerning carbon dioxide. According to charts it has a critical temperature of 87 F. and pressure of 1067 psia. Yet many mechanics tell me it is not uncommon to see carbon dioxide systems working in pressures of from 1200 to 1800 lbs. head pressure. If this is true, what happens and how is it possible to work above critical?—V.D.R.

ANSWER: If you will study Fig. 4, page 33 of Refrigeration Theory and Applications you will note that CO_2 is a (compressed) liquid if its temperature is below 87.8 F. even though its pressure is above the critical pressure. In other words its state or phase is determined by its *critical temperature* rather than by its *critical pressure*. According to Table XI of CO_2 on page 156 the critical temperature is 87.8 F. and corresponding pressure is 1069.4 psia. This is shown again on the CO_2 chart No. 3.

At a temperature of 90 F. and pressure of 1400 psia, both of which are above the critical, the CO_2 is a dense fog having an enthalpy of 70 Btu. per pound. When this dense fog is throttled to a pressure of about 1320 psia it becomes a clear compressed liquid; and when its pressure is further reduced to about 926 psia it becomes a saturated liquid.

Goosman, who has made an intense study of CO_2 recommends that for economical operation the temperature and pressure of the CO_2 leaving the condenser should lie on the WORKING PRESSURE line shown on the Pressure-enthalpy chart. This will give the least theoretical horse power per ton of refrigeration, because it increases the refrigerating effect per pound several Btu. more than it increases the work required to compress it.—H.G.V.

Air Circulating Pattern

Question No. 810: With what direction of air discharge would you install two ceiling type fan cooling units in a refrigerated room 15 ft. by 24 ft. by 8 ft., 6 in. high, with a door centrally located at one end?—R.L.R.

ANSWER No. 1: Because of the broad limits implied but not stated in the question, the answer too must be broad Generally, the rule is to establish uniform as possible diffusion of the air—the media by which the work is transferred to the surface—throughout the room. In a room of these proportions I would recommend that one fan be located about 6 feet in from the end of the room and about 3 feet in from the wall and do the same thing at the opposite end of the room with the second unit, both discharging in opposite directions so as to bring about a circular air motion and diffusion of the air throughout the room. The desired end is of course to have as uniform a temperature as possible throughout the room, and we presuppose that the room is not stacked too tightly with stored goods to impede air motion and permit heat pickup.

Since the air within the room is maintained at a lower temperature, lower vapor pressure and lower vapor content than the outside air, it is apparent that we should strive to make the air coming in through the door with its warmth and moisture impinge so far as possible directly on the surface of the unit so as to remove the moisture and cool the air, thus preventing that condensation and moisture from being deposited on the stored goods. So doing further prevents modulations or changes in temperature to which the goods stored are exposed. Should frost result it will be collected on the coil surface where it can readily be removed by defrosting.

There are certain conditions where the circular motion of air should be in vertical plane. In those cases the units should discharge in the same direction and bring about that rotary circulation vertically instead of horizontally, as above outlined. Those conditions are to be duly weighed and the question as stated must be confined and more

specifically given for a more precise answer. The point is, air is the media by which the heat is absorbed and conveyed from the surface of the products and therefore we must dispose that air throughout the conditioned area and room volume, as uniformly as possible. We should also try to knock down the frost or moisture content of the warm air that might come in through a door opening as quickly as possible and have the units so located as to accomplish this purpose.—A. G. Loeffel.

ANSWER No. 2: I think the ideal location for two ceiling type fan cooling units would be six feet from each end and equidistant from the side walls provided that these units were of the following design:

(1) The fan should be located at the top and drive the air downward through the extended surface coils.
(2) The air should be discharged horizontally in all directions.
(3) The overall depth of unit from ceiling should be not more than 30 inches to give at least 6 ft. clearance or head room above the floor.

Two units of this design with a throw of 7½ feet from center of fan shaft would give excellent diffusion throughout the room.

If units requiring a maximum depth of 30 inches from ceiling cannot be purchased then for practical reasons I would locate them in opposite corners of the room and direct the air somewhat diagonally across the ceiling of the room. This will necessitate a greater air velocity through the vanes to give the extra throw.

Nothing is stated in the question about the temperature to be maintained nor the load upon the coils. The temperature would have a bearing upon the need for defrosters, and the space required to take care of the drip from the defrosters, especially if water defrosters were used. The load upon the coils would have a bearing upon the space required for said coils.

I am afraid that I cannot give you an answer that is very specific.—H. G. Venemann.

About Valve Placement

We appreciate the following comment on the question of placing valve stems in a vertical or horizontal position which was received from our past national president in Washington, D. C.

Question No. 806 in the March issue of ICE AND REFRIGERATION struck my fancy and brings forth the following comment: Ammonia globe valves with detachable buttons (with the exception of one instance explained later) whether installed in liquid lines or gas lines should be in a vertical position for this reason. When the button attached to the stem has sufficient movement so as to become cocked when in a horizontal position, it has been found that after some use the valve button will not seat properly on the valve seat and will give trouble in later years caused by this condition.

The exception above is where globe valves are installed in liquid lines between the ammonia condenser and the ammonia receiver. These valves should be installed in a horizontal position so that foul gasses can go from the ammonia condensor to the receiver where it is the best place to purge foul gasses from the system. If the valve is installed with the stem in a vertical position, liquid will fill the area underneath the valve button to the level of the seat and seal off a considerable amount of gasses that should flow freely to the ammonia receiver.

E. L. W. must appreciate that regardless of the position of the valve stem packing on liquid lines leading from the receiver to the evaporators, liquid will always be in contact with the packing. Valves installed between the condensor and receiver in a horizontal position might have liquid against the packing but this would not be a disadvantage.—Walter E. Bernd.

New Questions

Cold Plate Solutions

Question No. 811: Please give me the formulas to use to make up eutectic solutions having a freezing temperature or melting point of approximately minus 10 and plus 20 F. If you have formulas for making eutectic solutions for other temperature characteristics I would appreciate these also. The latent heat per pound of solution would also be appreciated for each formula.—R.H.D.

Applying Freezer Refrigeration

Question No. 812: We are planning to construct storage facilities for meat, poultry, and other frozen foods at minus 10 F. The question has been raised as to the best method of refrigerating these storage rooms. It appears that some difference of opinion exists as to whether coils for gravity air circulation or dry or sprayed surface unit coolers with blowers would be best. Has any recent research, investigation or general concensus developed an answer to this question?—J.K.W.

Duct Distribution of Air

Question No. 813: Where blower actuated refrigerating units are used in a freezer storage room, can you tell me under what conditions it is best to use ducts for distributing the air and when ducts are not required for proper distribution of the refrigerated air?—J.K.W.

Member Activities

Rio Grande Valley

BY W. R. WOOLRICH, JR.

THE Rio Grande Valley Chapter reached its first anniversary on May first. In retrospect, briefly, the first year proved what the organizers of the chapter had set out to accomplish. The members find that the course of instruction is beneficial to themselves, and their employers have shown by their cooperation in the Chapter activities how highly they regard the purposes of NAPRE.

The keynote of our meetings has been self-improvement through broadening our knowledge of refrigeration theory and practice. Our able instructor, John Muller, has maintained a healthy balance between theory and practice. His policy has been to treat each subject completely and thoroughly before advancing to the next one. No dead-lines are set up for completing a phase of instruction. In view of the variation in the members past experience and education, this approach to the more difficult theories has been quite successful.

Our membership totals thirty-eight at the present. An active membership committee headed by Arnin Doneis has started an ambitious program to gain more members. His letters to employers of prospective members may be found effective by other chapters.

President McDonald recently appointed an auditing committee to go over the chapter accounts and report on the first year's operation. A nominating committee also was appointed to propose officers for our second year.

In addition to the regular course presented by Instructor John Muller, the educational program has provided a number of interesting features. The sound motion picture, "Water, Water Everywhere," produced by the American Cyanamid Co. was shown to the chapter and this was followed by a question period on problems of treating and demineralizing water.

Mr. Muller used the three giant photos provided by the York Corp. to illustrate a lecture on the design and operation of modern refrigerating compressors. An explanation of volumetic efficiency and clearance developed into a discussion of indicators, valves and the effect of large clearances on compressor capacity.

At our latest meeting our member, A. M. Casberg, led a discussion on indicators and analysis of indicator cards. Mr. Casberg had an indicator which he explained in detail and he passed around several indicator cards taken on an am-

monia compressor. He explained how the operation of a compressor or steam engine could be analyzed from indicator cards.

Seattle

By J. D. Henion

The chapter has taken steps to increase membership and secure a higher proportion of attendance at the meetings. By vote of the chapter, authorization was given to purchase a mimeograph machine and a file cabinet to facilitate chapter operations.

Special speaker at the meeting was H. T. Orebaugh, sales engineer of W. E. Stone & Co. Mr. Orebaugh's topic was "Low Temperature Evaporators and Frozen Foods." He gave a very informative description of the freezing of foods by several different methods. He stated that prior to 1934 most all frozen food was processed by tray freezing. Since that time, however, there have been many improvements in food handling and the general design of freezing equipment. Some notable examples discussed were the air blast, most popular method in this area, the Birdseye Multistage froster, the submersion type, of which there are several installations in California, the immersion process and the Finnegan tunnel.

Mr. Orebaugh then made a very enlightening comparison of the advantages and disadvantages of each of these processes, comparing the adaptability of the various methods to the freezing of specific kinds of food, initial investment, operating characteristics, mechanized construction, packaging of the foods, rates of freezing, and dehydration of the product. His talk was illustrated with large scale drawings of a typical evaporator and freezing tunnel. Mr. Orebaugh concluded his talk by stating that he would be happy to answer questions. This resulted in a general question and answer session that was thoroughly enjoyed by all. Mr. Orebaugh is to be commended for his very fine presentation, which was thoroughly enjoyed by all.

New member Hale C. Hendrickson of Dayton, Ore., was welcomed into the chapter.

Memphis

By Charles Conley

At the first of a series of excellent meetings, James Gilreath, field lubricating engineer for Esso Standard Oil Co., talked on oils and greases—their use and application. He explained the difference in the two general bases of oils, asphalt and paraffine base. In addition he also described the properties of greases having sodium and calcium bases. Modern types of bearings and machines of high speed piston travel have placed more exacting requirements on lubrication than the old slow speed equipment did. While all greases contain some moisture, it is held at a minimum by the manufacturer and grease should not be kept on hand for long periods unless it is protected by sealed containers. An interesting discussion was presented of the various applications of oil.

Everyone in the meeting received a can of lighter fluid and door prizes of a generous supply of oil were presented to C. W. Sullivan, John Hanson, C. H. Lovejoy and Charles Conley.

The following meeting was addressed by Charles Conley who talked on cold storage problems. He gave a brief outline of the history of cold storage plants, the types of refrigerating machines that were used in the older plants and those that are used today in the more modern plants. His ideas on good operating procedure for the most efficient plants were given and he described methods used to keep plants operating without shutdown during peak loads.

Blackboard illustrations were used to show the value of insulation on the walls, roof, floors and how bringing warm products into refrigerated rooms affects the load. The increased refrigeration load developed by freezing of products was explained. Mr. Conley used Prof. Venemann's textbook, especially Lessons 13, 14, 19 and 20, to create a lot of interest and brought out many questions.

The subject of water treatment was presented by Robert Bruce, general superintendent, Memphis Generating Co., the largest steam electric generating plant in this section of the country. Mr. Bruce is not a chemist; he talked on water treatment from the experience of one who uses a "whale" of a lot of water and he knows water and water treatment in a practical way. Various methods of treatment were described and the results analyzed. Mr. Bruce said that sometimes a specific water treatment overcomes one difficulty but brings on another in boiler operation. He declared that in his experience he has not found anything that will prevent scale in tubes of condensers and boilers because the materials on the market to remove scale also remove the tubes and deteriorate other equipment. The chapter welcomed E. L. Eaker to membership.

Sacramento

By D. W. Barton

Our regular meeting was held in the cafeteria of the Bercut-Rogers Packing Co. Moving pictures were shown on materials handling, warehousing and shipping. Then further information was presented by Roy Perin of the Ira G. Perin Electric Truck Manufacturing Co. The subject was fully discussed and questions were answered by Willard Grundel, Electric Storage Battery Co., and J. B. McDonough, General Electric Co.

We had a very interesting and instructive meeting. Appreciation is due E. S. Prudhomme, Sacramento branch of the General Electric Co., and Quaid Minnich of our chapter for arranging the program. Refreshments were served following the meeting.

Pittsburgh

By Louis P. Mantz

President Frank Sams was incapacitated by fumes from acetylene welding, but we were pleased to learn that he is improving and will be with us again in a reasonable time.

The educational committee has developed a list of interesting motion pictures which would be valuable for presentation on our program. To utilize them, the chapter will need a motion picture machine. A committee composed of Otto Knoch, Jenkins, Benns and Kessel was appointed to investigate movie machines and report to the meeting.

Chairman Ray Leitholf of the chapter Operating Data Book committee reported the results of his work in securing advertising and requested assistance of the different members to increase the number of "ads" in the book.

In a discussion of the regular educational program, there were several suggestions that lectures be scheduled based on material in the N A P R E textbooks, and the educational committee is working on this arrangement.

Los Angeles

By Fred Herr

Earl P. Miller, research technician of the Stauffer Chemical Co. headlined the educational program of the April 6 meeting of Los Angeles Chapter with a talk on "Sulphuric Acid in Industry." In his paper Mr. Miller discussed the modern day uses of this acid as applied both in the Southern California area and in the United States as a whole. He described some of the manufacturing processes involved and other pertinent points on the subject, and went into some detail about the reaction involved, the type of equipment used, and some of the by-products.

The roll call for the business session found an exceptionally representative attendance of 66 on hand. The applications of four prospective new members were favorably acted upon. These were Clarence Kleist, Joe H. Green, Melvin E. Gilbert and H. D. Powell. Walter C. Phillips, Jr., had his transfer from San Francisco Chapter to Los Angeles Chapter approved.

Upon motion of John Anthoney of the Ordinance Committee, the secretary was instructed to advise the California Institute of Power Engineers concerning NAPRE recommendations for an engineers' licensing ordinance now pending in Los Angeles.

A report by Dale Rycradt of the entertainment committee recommended that the chapter hold its 1949 Jamboree this fall in the form of a limited-attendance affair in conjunction with the annual ham-and-beans dinner and that attendance be restricted to 300 members and approved guests only.

At the previous meeting, the members heard an interesting talk on "Safety in the Refrigerating Plant" by William E. Osborn of the California Consumers Corp. Mr. Osborn stressed the need for refrigeration plant workers being safety-minded.

Elmer Johnson called attention to the new educational material on refrigeration being prepared by the national educational committee and requested suggestions for its improvement.

Lloyd Wenner's application for membership was approved.

Colton

By H. O. Bonter

Both of the recent meetings have been held at the Santa Fe Ice Plant. The first was a special meeting to which Ed. Nelson, division engineer of the Union Ice Co., gave an illustrated lecture on his recent trip to Texas, New Orleans and Mexico. During his stay in Texas, he attended a short course for ice plant engineers presented at the Agricultural and Mechanical College which he described in some detail. A number of color moving pictures were presented to show ice plants in the different territories and Mr. Nelson explained their designs and methods of operation.

At the second meeting of the month, Mr. Carlson gave us our first class lesson on condensers. Wm. Bajari and J. Van Leur regional sales supervisor and field manager for the Eutectic Welding Alloys Corp., Compton, Calif., gave a practical demonstration of gas and electric welding. They used the eutectic low temperature welding rods of various types of alloys to demonstrate the different methods and applications of welding and brazing.

At the conclusion of the meeting, the group retired to the lunch room for the usual feed of coffee, doughnuts, pie and cheese. That should make our absent members hungry enough to come to our meetings regularly.

Tacoma

By C. W. E. Johnson

An excellent lecture on the heat pump was presented by chairman Otto Stolz of the Educational Committee. He based his discussion on the University of Kentucky bulletin on this subject. Using the blackboard for his calculations, Otto showed that with the coefficient of performance of 4, a heat pump would deliver one million Btu. for about one-half the fuel cost based on coal at $15.00 per ton. This favorable ratio for the heat pump is partly based on the low power rate in Tacoma of ¾ cents per kilowatt hour. The greatest drawback to the use of heat pumps, he said, is the high cost of the unit and the source of heat.

The following officers were elected to serve the chapter during the year:

President, L. E. Haase
Vice-president, E. D. Branscomb
Secretary, C. W. E. Johnson
Educational Committee: Otto Stolz and R. R. Slater
Membership Committee: Chairman, W. D. Vanderflute.

San Francisco

By F. H. McLaughlin

California Chapter No. 1 held its annual High Jinks for 1949, and needless to say, it was a well attended affair. Exactly 325 members and guests were present. The evening's entertainment consisted of a scintillating series of acts presented by professional entertainers of note and was kept moving at a breath-taking rate by an excellent master of ceremonies. The affair was complete with beer, sandwiches and condiments. All participants, members and guests enjoyed themselves immensely and will not forget this year's High Jinks for some time. Our Entertainment Committee Chairman, Bert McKenna, is to be congratulated for his exceptional handling of this event.

Our next regular meeting had as its highlight a talk accompanied by slides that was presented by Bill Krack, the Pacific Coast Representative of the Sporlan Valve Company of St. Louis. Mr. Krack's topic was "Thermostatic Expansion Valves, Their Construction and Operation." This presentation was most educational and appreciated by all of the members. Mr. Krack's grasp of the subject made it very easy for him to put over the more difficult points of his discussion. We sincerely hope that we may have him back with us in the near future.

Minnesota

By Richard Bonney

Minnesota Chapter has had some very interesting subjects for discussion at recent meetings. Herb Gartner of Gartner Refrigerating Co., discussed pilot controls for thermal expansion valves, and methods of hookup.

At the next meeting, Lou O'Connor of Land-o'Lakes Creameries talked on a reverse acting refrigerating system to control heating and cooling with the same refrigeration unit using two cooling towers, one as a condenser, and one as an evaporator when used for cooling. The refrigerant flow is then reversed so that the evaporator becomes a condenser and the condenser an evaporator when used for heating. The hookup used to change the flows was quite ingenious. The system is being used to change the temperature of a seed germination room over a 24-hour period to approximate natural conditions at high humidity.

A fine sound movie, "The Story Behind the Underwriters Laboratories," was shown at the following meeting. The picture shows how apparatus and equipment is tested and approved for fire protection, electrical protection, etc., and the elaborate equipment necessary to simulate extreme conditions which might be encountered in actual service. Some interesting questions from the Question Box were discussed, among them, methods of detecting air in a refrigeration system, and methods of hookup for hot gas defrosting of low temperature equipment.

Our refreshment committee, Ed Gibbs and Charlie Baker, has been doing a fine job; we have had excellent lunches served at our recent meetings.

Chicago

By E. B. Jones

Chairman Clifford of the special committee to select a movie projector announced that arrangements had been made to purchase an Apollo Machine and that it had been delivered for use this evening. The first movie shown was a techni-color film on steam boilers produced by the Babcock and Wilcox Co. In brief fashion it traced the beginnings of steam boilers and engines and showed how larger and larger units were designed to produce better fuel economy and operate at higher pressures and temperatures. In recent years the boilers became very large and powdered coal came into wide use. To preserve boiler setting and reduce maintenance water screen walls were introduced and separate initial combustion chambers were added to facilitate ash removal. Along with economizers and air pre-heaters the steam re-heating cycle was introduced and other refinements were utilized. As a result fuel consumption was reduced during the last 50 years from almost 7 lbs. to 0.85 lbs. per kwh. generated in large central stations. The processes of manufacturing and installing large boilers were an interesting part of this excellent movie.

(Continued on page 70)

Freshmen Predominate in Membership Race

THE freshmen green identifies most of the contestants in the 1949 membership race, although 3 chapters have moved into the elevated station of upper-classmen and 2 have attained the sophomore rank.

The letters sent out recently by Chairman William Finnegan of the Membership Committee have stirred a number of the local chairmen. It is expected that more chapters in the near future will give evidence of a higher I.Q. In this case the initials represent Initiative Quotient.

During the month St. Louis decided to improve its position and jumped into the Junior class. Minnesota Chapter joined Detroit under the Sophomore rating.

Top positions continue to be held by Los Angeles on total points and Marion on a percentage basis. The present line up is as follows:

Seniors	
Los Angeles	Marion
Junior	
St. Louis	
Sophomore	
Detroit	Minnesota
Freshmen	
New Orleans	Fresno
Pittsburgh	San Jose
Chicago	Yakima
San Francisco	Memphis
Sacramento	Portland
Dallas	Seattle
Stockton-Modesto	

ENGINE ROOM POINTERS –

It Pays To Keep Boilers "Desooted"

MOST readers are doubtless aware that soot on boiler heating surfaces is "bad", but do you know how bad? Considerable has already been written on the subject of soot, but here is a little table that the writer just came across in his files which he thinks should be put in print. It gives the approximate loss in fuel due to various thicknesses of soot, as follows:

If the thickness of soot is 1/32 in., the fuel loss is 9.5 per cent;

If the thickness of soot is 1/16 in., the fuel loss is 26.2 per cent;

If the thickness of soot is ⅛ in., the fuel loss is 45.2 per cent;

If the thickness of soot is 3/16 in., the fuel loss is 69.0 per cent.

Many boilers are still being cleaned by hand despite all the permanent cleaners that have been installed. Hand cleaning on regularly operated boilers is undesirable and expensive because of the fact that the boiler is usually exposed to a rush of cold air on the heating surfaces during the cleaning process. Loss of fuel is thus a direct result. Some types of boilers cannot be cleaned by hand at all while in operation but must first be shut down. To shut down a boiler can be distressingly expensive.

To make it possible to clean a boiler by hand while it is in operation it is first necessary to equip the setting with a large number of blow holes to bring as much of the heating surface as possible within range of the hand lance. Hence the entire side of the boiler setting is often literally made out of blow doors. These doors admit air when they are opened, and they usually admit some air when they are closed, because it is almost impossible to stop all leaks without repacking every time the doors are used. After installing a permanent mechanical soot blower the number of doors can be reduced to only those that will be necessary for inspection purposes. Furthermore these few doors, on account of their infrequent use, can be made practically air tight.

Tests have shown that on account of the surplus air in leakage through hand lanced boiler settings, there is an average drop of 4 per cent carbon dioxide in the flue gases—an item that is not to be ignored. For example, a consulting engineer, making investigations at a small plant, found after repeated tests that the CO_2 was down as low as 4 per cent. By making changes in the dampers this was raised to 6 per cent. The setting was then carefully examined for cracks by means of a lighted candle. Numerous cracks, so small as to be scarcely noticeable, were found. The pull on the flame was particularly noticeable in the brick work around the hand lance doors of the boiler. After closing those leaks with cement the CO_2 was brought up to 9½ per cent.

It is common practice among engineers to assume a saving of 5 per cent of the fuel by installing a soot cleaner in preference to the old hand lance, under conditions that are otherwise good. If, however, there is considerable leakage through the boiler setting and the CO_2 is low, if all openings are bricked up or permanently closed after installation of the cleaner, the annual saving may be 7 per cent of the fuel. Where conditions are unusually bad the fuel saving often runs up to 10 per cent. These savings result from more thorough cleaning, more frequent cleaning, and the practical elimination of all air inleakage by the sealing of all former hand lance doors.

This Designer Purposely Made the Steam Pipes a Trifle Short

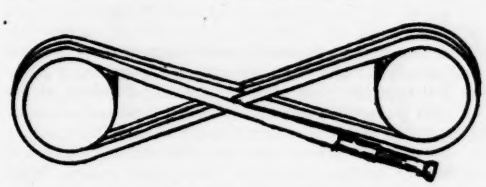
HERE is a method for dimensioning lengths of steam pipes in such a way that they can be removed easily in case of repairs. The method was brought to the writer's attention by the designing engineer who holds a responsible position with a large eastern utility company of national repute.

As every reader doubtless knows, it is common practice where a straight steam pipe is installed in an average plant, to make little if any allowance for pipe expansion when under steam. The expansion is permitted to "take care of itself," which often is the cause of creating dangerous stresses in the pipes and auxiliary connections. To take care of these elongations in the place where bends were impractical or were to be avoided as much as possible, this designer made the pipe initially short, purposely—a small fractional part of an inch for every ten feet of pipe length. The longitudinal stresses in the pipe, when cold, were therefore tensional stresses. Hence, should it be desired to take out any length of the pipe a bolted flange-pipe can be dropped out with the utmost ease.

Calculations were such that when the pipe is under steam pressure the shortage is taken up by expansion. Then there are no longitudinal stresses in the pipe whatever. So in addition to making for convenience this method possesses safety advantages of value.

How to Coil Hose, Rope, Cable, Wire, Without Kinking

THE accompanying sketch shows how to coil hose, rope, wire, etc., so that there will be no "kink". That is, coil it in the form of a figure 8. The sketch shows how this writer coils his hose—over two metal cans 12 inches in diameter. By doing it in this way the "other end" of the hose, not visible in the sketch, can be permanently attached to the pressure water line making it unnecessary to attach and remove the hose every time it is used.



The reason why the old troublesome "kink" is eliminated is as follows: you first coil the hose around one can in one direction, and then coil it around the other can in the opposite direction. The kink that tends to form with the first turn is neutralized with the second turn, and as a result there isn't any kink at all. Not only is this method a time saver; it is a hose, rope, and cable saver.

Boiler Water Troubles

THIS writer was asked the other day, "What is the best way to eliminate boiler scale trouble? The water we use in our boiler forms scale and causes considerable trouble."

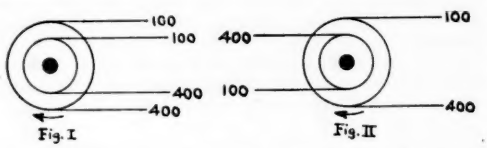
Have the water analyzed by a reputable analyst. There are a number of responsible concerns engaged in the water treatment business who maintain analyzing departments, and, in general, what they tell you is dependable. If it were not dependable they could not remain in business year after year as they do.

Send at least a quart sample of your boiler water to one of these responsible "boiler feed water doctors." The "doctor" can and will tell you just what treatment is necessary and he will tell you how to do it. Advice obtained from such a source is of far more value than many pages of abstruse arguments on various chemicals written by people who favor one particular remedy such as tri-sodium phosphate. That chemical may be all right for some boilers, but it is not all right for all boilers. You and the rest of us, for instance, don't take the same medicine for every bodily ailment. It is just as illogical to use the same treatment for every water.

Before sending the sample of water to the "doctor" be sure that its bottle or container was perfectly clean. That is very important. Also be sure that the sample is truly representative. Don't take hot water out of the boiler, as someimes advised by quacks. Why? Because the water may be already partly purified by the heat. Most of the solids may already be precipitated. The sample should be taken out of the supply line.—S. F. W.

How to Avoid Common Transmission Error

THE thing to do is to "balance" the drive if you can, or, use an outboard bearing. The sketch in Fig. 1 shows an error in arrangement of pulleys and belts that is commonly made. The larger pulley is the standard pulley on an electric motor or on an engine. Let us say for convenience that it is on a motor and that the motor is underloaded. Somebody sees an opportunity to increase the load, so the smaller pulley is added. That is, two pulleys are placed side by side on the same overhanging shaft and both belts pull against the bearing in the same direction. The total pull against the bearing as indicated by the figures amounts to 100 plus 100 plus 400 plus 400, or 1000 pounds.



Inasmuch as motor bearings are designed for a definite bending force, this is obviously not good engineering practice. All bearings have their limitations, of course, if the two belts leave the pulleys in the same direction as shown in Fig. 1, the design is wrong because the chances are that the bearing will not be able to withstand the combined leverage or bending moments. The outside pulley, being farther away, causes the bending stress to be greater in the bearing than that due to an equal pull on the inner pulley.

The correct method of balancing is shown in Fig. 2. By so arranging the drives that the belts will leave in "opposite" directions, the bending stress will be less than would be the case with a single pulley and with the motor pulley fully loaded. Such a condition is all right. Here we have 500 pounds acting in one direction which is exactly balanced by 500 pounds acting the other way. (400 plus 100)—(100 plus 400) equals zero. The belt at the left, Fig. 2, is a top pull belt, true, but that is better than ruining the motor for the sake of two underpull belts.

Further, a point to bear in mind is this: overhung pulleys on electric motors or engines should always be operated as close to the bearing as possible. If you MUST run belts as shown in Fig. 1, or if you MUST place the pulley at a considerable distance from the motor bearing, use an additional outboard bearing. The outboard bearing will soon pay for itself in the saving of shafts, bearings, and power.

Twenty Savers of Profits in Handling of Lubricants

1. Where large volume of lubricants are used a central oil storage house, set apart from the main plant, is always best.

2. Avoid storage on wood floors for woodwork soaks up oil and grease from handling and becomes a fire hazard.

3. If possible have doors and windows of steel frame or roller type and fitted with wire glass and automatic closing devices.

4. Have lubricant storage facilities close at hand in order to reduce transportation time involved.

5. Where lubricants are stored in barrels or drums it is always best to have hoisting equipment handy.

6. Good temperature control in storage enables all types of lubricants to be handled much more efficiently. Wide temperature fluctuations mean sweating and condensation of moisture in containers.

7. Pumps, meters and other measuring devices will quickly save their cost over hand handling and use where even moderate quantities are involved.

8. Keep oil drums on end and always check storage to see that no water can get into opened drums.

9. Make certain bungs and seals on drums are always kept tight to avoid moisture and other contamination as well as drippings.

10. Have drum seal and bung wrenches at hand in storage in order to always be certain that seals are tight.

11. Store only a slight excess of the amount needed. Lubricants are always better when fresh. Large stocks invite contamination and waste in use.

12. Keep monthly lubrication records for better and more accurate control not only in storage but also in use.

13. Always have suitable containers at hand to catch all oil drip.

14. Have reliable fire protection equipment close at hand near all storage and make sure this equipment is tested regularly and often.

15. Have a regular clean-up routine of all storage facilities as well as on machinery and equipment, particularly following a regular lubrication job.

16. Collect and keep all oil soaked clothes in covered metal containers and have them washed before they are used again.

17. Have sand at hand in sand boxes for fire protection but keep these away from oil containers for sand is a damaging abrasive when suspended in lubricants of any kind.

18. Get tough when someone permits spilled or dripped oils to accumulate anywhere . . . that generally means trouble of one kind or another.

19. Have it a hard and fast rule that all spilled oils or other lubricants are wiped up immediately for they are not only a fire hazard but are easy for someone to slip upon with resultant personal injury.

20. Avoid the use of lint-shedding rags for wiper clothes. Lint, when lodged in bearings or oil circulation mediums, will clog and cause damage.—E. W. F.

Refrigerated Warehousing Industry

NEWS • ARTICLES • ANNOUNCEMENTS

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

Executive Offices:
Tower Building, Washington 5, D. C.

Secretary, W. M. O'Keefe
Executive Vice-pres., Wm. Dalton

President, Arthur N. Otis
New York, N. Y.

Vice-president, Fred F. Alford
Dallas, Tex

Treasurer, J. L. Gagini
Omaha, Nebr.

The Role of Refrigerated Warehouses in Distribution of Food Supplies—President Otis at Press Conference

THE orderly distribution of world food supplies is playing an increasingly important part in economic, political and military considerations, both at home and abroad, according to Arthur N. Otis, President of the National Association of Refrigerated Warehouses. Production, of course, is the basic consideration, but unless food, and particularly perishable food, in which our industry is primarily interested, can be placed where it is needed when it is needed, mere production is not enough. "And so," continued the NARW official, "we are becoming more conscious of the importance of distribution. Refrigerated warehouses which store the world's perishable foods supply from a season of flush production through the season of scarcity, are at the focal point in the distribution picture."

Mr. Otis, during a special press interview while in Washington to attend an "All-Industry Committee" meeting of Frozen Food leaders, called for Friday, April 8, forcefully demonstrated the increased role his industry is playing in the distribution of world food supplies by outlining the growth of the industry. "Twenty years ago," he said, "there were less than 317 million cubic feet of public refrigerated space in the United States. Today that figure has increased to well over 413 million cubic feet, 10 million cubic feet of which have been added during the last four years."

Increase in Frozen Foods

Most of this increase has come in the freezing temperature ranges as a result of the rapid growth and acceptance of frozen foods. However, it should not be overlooked that our industry in the United States is more than sixty years old, and that perishable foods like butter, meat, poultry, and frozen eggs, are still among the principal items held by our industry in its warehouses at below zero temperatures, even though frozen fish and frozen fruits and vegetables have become increasingly important items.

Some idea of the vast quantities of perishable foods handled by refrigerated warehouses is shown by the fact that on March 1 of this year there were over 3 billion pounds of perishables in storage in the United States, and this is a period of low occupancy.

"The job of moving these tremendous quantities of food from farm to table is receiving constantly closer attention by warehousemen," said Mr. Otis. In addition to storing these foods, warehousemen render many other distribution services such as quick freezing, distributing pool cars, packing, and sorting.

"All this is a highly scientific business requiring years of experience," emphasized Mr. Otis. "Warehousemen must store each commodity at specific temperatures and humidities to assure maintenance of maximum quality. It is not unusual for a warehouse to have twenty-five different rooms for half as many different commodities, each at a different temperature and humidity."

Scientific Study of Storage

Realizing the importance of scientific storage and handling, the industry founded The Refrigeration Research Foundation five years ago to seek ways and means of improving perishable food storage, handling and distribution, and to discover other items which would be improved by holding at low temperatures. A food product has certain degrees of flavor, color, texture, aroma, purity, vitamin content and other nutritive values. These degrees of quality measure dollars and cents values. By constantly maintaining these values found in the fresh product through improved handling, storage and distribution, the warehousing industry is helping farmers, packers and processors, and bringing a high quality, nutritive, flavorful product to the tables of consumers everywhere.

"The problem of distribution has been more or less taken for granted, and those of us who enjoy frozen fresh products in our homes, in season and out of season, are not often reminded that perishables are transported and handled a number of times from production location to consumption point; by railroads or steamship into a refrigerated warehouse, then to retailer and finally by delivery truck to the restaurant, hotel, or the home.

High Wages Increases Costs

"We remark sometimes that the price spread between the cost on farm and the cost of the processed graded product in our home seems high." Mr. Otis recalled that "we seldom remember that wages, which in some cases have doubled in the past sixteen years, and in many cases rightly so, are none the less the principle factor in the cost of distribution which appears large unless all the necessary steps to put the product in the consumer's home are considered."

To do their part, refrigerated warehouses have invested, and are investing, substantial additional sums of money in machinery for handling in unit loads on pallets to cut down, or at least prevent further increases in handling cost at the stop off point between producer and consumer.

Hundreds of strategically located public refrigerated warehouses are cooperating with NARW and TRRF in this work. They are essential links in the chain of marketing processes, which make America the best fed, strongest Nation in the world.

In addition to serving as President of NARW, Mr. Otis is vice-president of The Refrigeration Research Foundation, President, Merchants Refrigerating Co., New York City, Director of the American Institute of Refrigeration, and Food Service Consultant, Department of the Army.

A Message from President Otis

IN assuming the presidency of our Association, I am deeply appreciative of the confidence you have bestowed upon me. I am also aware of the responsibilities and obligations contained in that office. In following the fine examples set by previous administrations, I am hopeful that we can continue to render to the members of NARW outstanding service and a provision of both national and Washington representation of the highest caliber. I am confident this is not only possible, but also that it is possible to increase those advantages in your interest—with the proper help and attitude on your part. Naturally, I call on you for help; for suggestions, ideas and criticisms with constructive suggestions attached. Our industry is more vital than ever, and especially in these times of increasing emphasis on the distribution of foods and foods perishables. Our Association is strong, active, and at your service.

Sincerely,
ARTHUR N. OTIS., president
National Association of Refrigerated Warehouses

Split Billing—Percentage Occupancy

REPLIES to a recent questionnaire by the National Association of Refrigerated Warehouses on the questions of split billing and the percentage of occupancy showed the following:

Eighty per cent of those replying stated they were opposed to end of the month billing; twenty per cent favored this method. Objections were that it was contrary to general practice, it increased the work load at the end of the month, and accommodating a few customers in this regard would lead to similar demands from others. Those favoring the method thought it simpler and more logical.

Of those replying to the question on determining percentage of occupancy, two-thirds said they used the visual inspection method; one third said they used a combination of visual inspection and tonnage occupancy. The concensus was that it is impractical to determine percentage of occupancy by the tonnage method alone because of the great variation in the densities of different commodities.

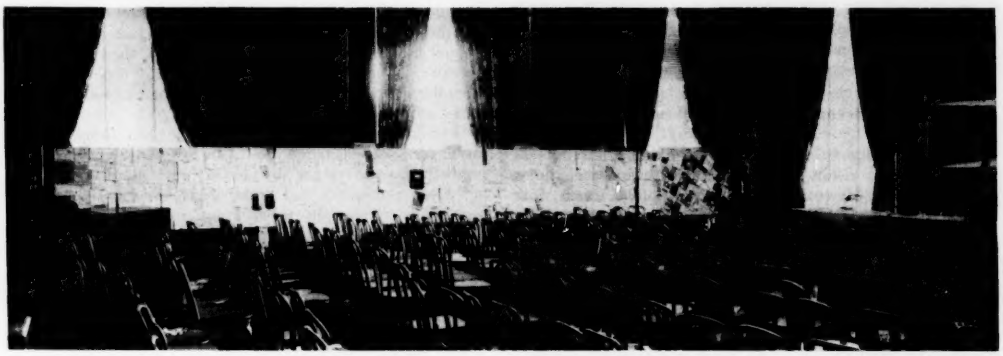
Foreign Trade Warehouse Bill

A NEW Bill H. R. 2621, recently introduced in Congress, would authorize the Secretary of the Treasury to designate foreign trade warehouses for the assembling, storage, repacking, etc., of foreign and domestic goods, customs free until shipped into United States customs territory. Under the bill, merchandise handled in a foreign trade warehouse could be re-exported without the complicated procedure now involved.

Quaker City Cold Storage Report

REPORT of the voting trustees of the Quaker City Cold Storage Co. Inc., Philadelphia, Pa., shows a net income of $59,619 for the eight months ended December 31, 1948. This is equal to 47 cents a share on the 127,847 common shares of $1 par value. Total operating revenues were $638,428.

Warehouse Forms Attract Interest at NARW Convention



One of the features of the recent 58th annual meeting of the National Association of Refrigerated Warehouses in San Francisco was the display by NARW members of the various forms and records used in connection with their operations. Outstanding among these was the display sponsored by the Los Angeles Cold Storage Company. This display was arranged to show exactly how the various forms are used to keep track of a shipment from time of receipt to time of delivery. It included driver's receipt, tally sheet, warehouse receipt, lot cards, transfer orders and receipts and the various order forms used in making deliveries. This display, as well as the general display of warehouse forms, attracted considerable attention among the delegates and visitors at the convention.

Refrigerated Warehousing Industry

Safety In Refrigerated Warehouses

By A. R. Shepherd

Chairman Safety Committee
National Association of Refrigerated Warehouses

WHEN this committee made its first report last year, the data available was meager and conclusions had to be drawn from estimates. No industry-wide survey had been made on accident experience and only seven companies were reporting to the National Safety Council for inclusion in their industrial accident summaries. At that time we were frank in our statement that the refrigerated warehouse group could not be satisfied with its accident experience. We requested your assistance in furnishing facts on which to base a remedial program.

During the summer, questionnaires were sent to all association members and we appreciate the fine response received from 88 companies reporting. This constitutes the first really representative survey of accident experience ever made of the industry. A total of more than 8 million man hours were covered in the questionnaire replies.

Shows High Frequency Rate

From the data furnished by the 88 refrigerated warehouses, the frequency rate for lost time injuries during 1947 was 98.83. For comparison, it will be noted that the average rate for all industries was 13.26. The record of our industry is more than 7 times that of the general industry average. Our frequency rate is almost double that of: Coal Mining at 54.46; Lumbering at 59.74.

Consideration of the hazards involved in work in our plants would indicate that our frequency of accidents is considerably out of proportion. In regard to severity rate, the picture is a little better but gives no reason for complacency. The severity rate for the cold storage industry is 2.81, which compares with an all-industry severity rate of 1.23, but is lower than that of five other large industries reporting.

One bright spot is found in the reports we received. There were 21 cold storage plants which had no injuries to workmen during 1947. On the whole, this first industry-wide survey provides few grounds for optimism. The frequency of injuries is much greater than we had estimated on the basis of limited data previously available. The first step, however, in any effective accident prevention program is to determine where you stand. Now this has been accomplished and we are ready to go forward.

Hidden Costs Involved

Probably our greatest problem will be to overcome the normal tendency most people have to let things go as they are. To justify the effort now required, let us consider what the statistics given above imply. A frequency rate of 98.83 means that there are many injuries involving compensation payments and, in addition, the medical expense is not a minor item. The costs are borne by insurance but the insurance rates we pay are much higher because of the frequency of injuries. Those companies which have carried on safety programs for many years and analyzed their costs have determined that indirect or hidden costs averaged five times the costs paid by insurance. These hidden costs for the employer are composed of such things as disruption of work, damage to materials and products, and loss of customer good will. For the worker—lost wages, lost earning and buying power. Furthermore, unchecked accidents bring on many personal problems. The better workmen tend to leave accident ridden industries so that the productivity of the remaining workers is reduced.

These facts are given in answer to the question frequently raised, "Can't I buy good insurance coverage and forget accident rates?" The answer is that, neglect will result in increased insurance costs which will prove to be a heavy drain on operations. At the same time, the quality of service you render to your customers will be lowered and your present difficulties in maintaining a satisfactory working force will be multiplied.

Because of its startling statements on rates of injuries in the refrigerated warehousing industry, the paper on this page should be read by all executives who are in position to do something about safety work. Mr. Shepherd, who has headed the refrigerated warehousing Safety Committee for two years, has uncovered some valuable facts that can be used as the basis for establishing an effective safety program.

Fortunately the road toward reduced worker injuries, lowered accident costs and better overall operations have been well marked by other industries which found themselves in the same situation and demonstrated that great improvement is possible. More than 35 years ago, certain industries reached the conclusion that they could no longer operate with the frequency and severity of the accidents then occurring. They joined with others faced with similar conditions and got to work on a remedial program. In the years that followed, many other industries joined in the work and experience has formulated effective methods.

One of the pioneers in accident prevention work was the steel industry. Everyone recognizes the numerous hazards in that industry which could produce many injuries to workmen. Their accident prevention programs, however, have resulted in a frequency rate reduction to 6.08 in 1947. The severity rate was 1.60. This is only one example of many which could be cited to show that a good well-organized safety program will reduce both frequency and severity of injuries.

It has been shown that our industry suffers from a very high frequency of injuries to its workers. At the same time, our direct costs for insurance and other expense is much too high. It has been demonstrated frequently by other industries that under similar circumstances they have been able to bring great improvement through well-organized accident prevention programs.

Management Must be Interested

The logical pathway for our industry is clearly revealed. Probably the first and greatest step we must take is to develop a sincere interest on the part of management which will bring a willingness to follow through and see that the necessary work is accomplished. Then, responsibility must

Report presented at 58th annual convention National Association of Refrigerated Warehouses.

be placed on one individual in each organization to set up a direct and full program of accident prevention. Many of you are familiar with what this involves and some of you are already obtaining good results from such a program. Fundamentally, it is composed of facilities for educating all workmen to do their job in a safe manner, the installation of such mechanical and plant safeguards as required, continued instruction to keep the program going, and careful analysis of all accidents in order to provide prompt remedial measures.

Some of the elements found to be effective in warehouse and other fields are as follows: Appoint a safety director and set up a program of accident prevention. Each warehouse should hold safety meetings with its key men on specified dates each month. The foreman and gang leaders should be included in this group in the larger plants, and smaller plants could include the entire personnel.

Accidents occurring during the period should be analyzed and suggestions brought out from the group on how to prevent similar injuries in the future. Unsafe methods, equipment or facilities should be reported and safety recommendations should be developed and put into effect. One of the principal purposes of these meetings should be to get your key men safety-minded so they, in turn, will carry their message to the fellow workmen. Allow these key men to play an important part in the discussions and feel that they are doing a large part in this promotion of safety. A good leader will make these meetings pay dividends by creating a more cooperative group of workmen not only in safety but in all work throughout the entire warehouse.

Special emphasis should be made to convey the safety thought to all new employees through these key men. It is advisable to have printed leaflets or instruction cards placed in the hands of each employee listing the hazards and accidents likely to happen if not guarded against by watchfulness.

Provide a safety bulletin board in a place where the men will see it frequently and post the number and kind of accidents each month. If avoidable, suggest how each accident could have been avoided, and bring out other accident facts that will help the cause.

Each warehouse could plan ahead for providing the following information quickly and with very little effort:

1—Average number of employees.

2—Total man hours worked.

3—Total lost time accidents.

4—Total days lost, including time allowed by the National Safety Council tables, for permanent total and permanent partial disabilities.

The above records will facilitate a quick survey of the industry to appraise us of our progress in safety. These records will determine our own rate of injury which can be compared to our previous rates and will become more useful when compared with the rates for the entire industry. A survey of the entire industry every six months would be very informative to all.

A Safety Program

It is necessary that some plan for safety be used in each warehouse and that action of some kind be taken to lessen the accidents in our industry. The particular plan of action is not so important, (there are many ways of doing the job) but definite action is the all important step if we wish to decrease our accident experience.

Your own insurance company will gladly help you set up a program. They will show films pertaining to accidents, furnish posters for the bulletin board, and will do an important part of the job, if allowed to do so. It is to their interest as well as yours. The National Safety Council is no doubt tops in safety, and a membership in that organization is certainly worthwhile. Whatever is done to lessen accidents must be done by the individual warehouse. There seems to be no exact formula to do this job. However, it has been done by other industries with excellent results, and our industry can do it too. No safety effort is wasted; freedom from accidents is a commodity of which there cannot be too much.

Figuring the insurance cost per cubic foot of space of one warehouse and applying this figure to the entire industry, the industry accident insurance would cost roughly three-fourths of a million dollars. A safety engineer could be had for probably $5,000 per year. If he saved only one per cent or $7,500, his salary would be paid. A saving of 25 to 50 per cent would not be unreasonable. This is something for us all to think about.

Summary

To summarize, may we repeat that our present situation in regard to injuries is not at all good. With continued neglect, it may become worse and in a competitive situation this would prove to be a serious drain on all of our operations. The way to improvement has been completely marked and demonstrated in use by other industries. The methods are relatively simple but any program must be based on a desire of management to accomplish results and its willingness to see the program through.

Effect of Variation in Temperature on Frozen Foods

A STUDY of the effect of variation and fluctuation in temperature during transportation and warehousing of frozen foods is to be conducted under the auspices of the Refrigeration Research Foundation at the Western Regional Research Laboratory at Albany, Calif. John R. Matchett will be the project leader.

This project is expected to supply much needed facts on what to expect in quality deterioration from exposure of packs of various kinds, volumes, and packing conditions when exposed to various temperature hazards. It is a Research and Marketing Act project, recommended by the Cold Storage Advisory Committee.

The project will be comprehensive. A leading railway official has asked for the factual basis for the general recommendation that frozen foods be stored and transported at 0 F. or below. Little data of a definite nature, with the exception of studies initiated for the benefit of locker plants and home freezers, are available. In this investigation it is expected that a great deal may be involved, such as radical changes in refrigerator-car service, in warehousing and handling, and in distribution and retail selling.

The results of this study, it is expected, will be of very great interest to the refrigerated warehousing industry as well as to other industries.

Frozen Fish—Annual Report

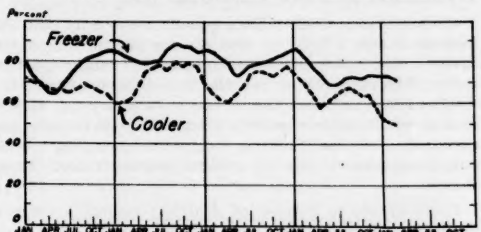
DURING 1948, stocks of frozen fish were slightly more than in 1947 according to a report by the Branch of Commercial Fisheries of the Department of the Interior. In the early part of the year they were somewhat lower than in 1947 but large holdings in the latter part of the year raised the average above the 1947 level. A peak of 158,000,000 lbs. was reached on December 1, only slightly lower than the record holdings of November 1, 1946. Production of frozen fish set a new record of 291,987,979 lbs., an increase of 18 per cent from the previous year.

Cold Storage Holdings—Coolers and Freezers Continue Downward Trend

COLD storage occupancy declined during February. On March 1, coolers were 49 per cent occupied, 3 points less than on February 1, and 17 points below the 5-year average. Freezers were 68 per cent occupied, a decline of 3 points and 13 points below average. Meat packers indicated their coolers 90 per cent occupied and freezers 82 per cent occupied.

The decline in February, while greater than the average change for coolers, was less than the decline in cooler occupancy recorded last year. Use of freezer space was expected to decline in February. The 3 point decline during the month exceeded the average decrease by 1 point. With 68 per cent occupancy reported on March 1, freezers were 13 points below the average and the occupancy reported last year this date. Private and semiprivate warehouses reported 44 per cent occupancy for coolers and 61 per cent for freezers. Meat-packers indicated coolers were 90 per cent occupied and freezers 82 per cent occupied. Occupancy of 90 per cent or more was reported for coolers in such cities as Omaha and Memphis, while freezer space with a similar occupancy was reported in Cincinnati, Minneapolis, Omaha and Baltimore.

Stocks of foodstuffs held under refrigeration on March 1 totaled 3 billion pounds. Cooler and freezer held commodities each amounted to 1.5 billion pounds. Stocks in cooler were the lowest on hand since 1946, while freezer held stocks were the lowest since 1945. Withdrawals of 268 million pounds during February consisted primarily of fresh fruits. Sausage, lard, and nuts and nutmeats increased during the month. All freezer items, except meat and meat products, were withdrawn from storage. Seasonal withdrawals of frozen fruits, vegetables, poultry and dairy products reduced stocks by 77 million pounds. Withdrawals of foodstuffs from both coolers and freezers fell far below the reduction in stocks reported last year when 435 million pounds of cooler commodities, and 109 million pounds of freezer commodities moved from storage.



Occupancy in Refrigerated Warehouses, 1945-1949

Creamery butter in storage Mar. 1 was about half the stocks on hand last month. During February, 10 million

TABLE I—COLD STORAGE HOLDINGS IN PUBLIC WAREHOUSES—BY COMMODITIES (000 OMITTED)

	March 1, 1949	Feb. 1, 1948	March 1, 1948	Five-year Average
Meat and meat products, lbs.	906,547	888,551	1,031,014	814,807
Lard and rendered pork fat, lbs.	182,291	160,610	137,416	154,287
Frozen poultry, lbs.	131,414	148,418	262,374	261,536
Creamery butter, lbs.	9,162	18,737	7,323	35,079
American cheese, lbs.	111,431	116,779	93,570	102,635
Other cheese, lbs.	13,226	15,707	14,304	15,976
Shell eggs, cases	148	152	374	940
Frozen eggs, lbs.	58,781	71,532	120,665	99,245
Apples, bu.	9,031	12,971	16,567	12,998
Frozen fruits, lbs.	301,861	317,695	316,819	239,526
Frozen vegetables, lbs.	229,553	262,047	226,619	191,460
Frozen fish	104,481	127,635	90,491	82,061

TABLE II—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu. ft.)		March 1, 1949 (%)		Feb. 1, 1948 (%)		March 1, 1948 (%)		5-Year Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	3,561	6,327	35	70	41	75	53	74	60	71
Middle Atlantic	42,086	33,798	44	62	50	66	62	78	64	84
East North Central	36,040	28,304	50	69	52	73	66	85	65	82
West North Central	11,006	16,733	51	83	56	85	67	89	67	79
South Atlantic	11,634	6,368	51	80	52	83	64	83	68	86
East South Central	4,199	3,847	62	86	61	87	72	85	72	80
West South Central	7,241	5,195	68	65	63	68	68	82	71	79
Mountain	2,150	2,707	40	59	47	65	70	84	73	91
Pacific	18,936	21,462	47	59	53	61	64	73	67	77
United States	136,853	124,741	68	49	52	71	65	81	66	81

TABLE III—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PAKING PLANTS

	Private and Semi-Private Warehouses						Meat Packing Establishments					
	Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent March 1, 1949		Space Occupied—Per Cent Feb. 1, 1949		Net Piling Space (000 Cu. Ft.)		Space Occupied—Per Cent March 1, 1949		Space Occupied—Per Cent Feb. 1, 1949	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	554	1,113	31	73	44	85	1,968	725	81	..	86	100
Middle Atlantic	3,293	4,430	38	55	34	60	6,731	740	85	69	87	65
East North Central	5,779	2,576	73	59	82	61	15,685	6,591	91	75	73	75
West North Central	2,123	3,929	74	78	66	70	25,718	10,549	91	88	90	87
South Atlantic	647	1,377	16	75	23	65	2,377	609	95	99	95	99
East South Central	190	101	..	..	100	100	2,014	403	48	88	54	90
West South Central	700	764	24	8	35	..	3,570	1,452	100	100	97	99
Mountain	182	654	81	47	78	55	2,028	666	96	99	95	99
Pacific	8,363	6,554	12	59	33	63	4,056	1,152	96	93	92	93
United States	18,851	21,498	44	61	53	62	65,347	22,887	90	82	85	85

pounds of butter were withdrawn leaving stocks at 9 million pounds. Cheddar cheese decreased by 6 million pounds while total cheese holdings of 127 million pounds were 8 million pounds less than on February 1. This reduction in chees stocks compares with 14 million pounds last year and the average decrease of 10 million pounds.

Shell eggs, down to 148 thousand cases, moved contra-seasonally when compared with the 5-year average. There was a net withdrawal of 4 thousand cases during February, whereas last year 100 thousand cases moved into storage. The average change for this time of year is an increase of 500 thousand cases. Frozen eggs totaled only 59 million pounds on March 1 because of greater than average withdrawals. The 13 million pound net reduction in stocks was the second highest since 1940.

Poultry stocks of 131 million pounds are exactly half the average March 1 holdings and are the second lowest for March 1 since 1939. The withdrawals of 17 million pounds during February compares with 31 million pounds withdrawn last year and the average February to March change of 24 million pounds. Heaviest withdrawals occurred in fowls and turkeys, their total accounting for 10 million pounds of the 17 million pounds moved from storage.

Fresh apples in storage on March 1 totaled 9 million bushels, compared with 17 million bushels on hand last year this date and the 5-year average March holdings of 13 million bushels.

Frozen fruits totaled 302 million pounds, down 16 million pounds from last month. Average decrease for this time of year is 26 million pounds, although last year this time 27 million pounds were withdrawn from storage. Frozen strawberries and cherries were the major items accounting for the net decrease in stocks. Only fruit juices and purees showed an increase.

Frozen vegetables were withdrawn from storage in greater than average amounts. The 32 million pound reduction during February brought stocks on hand March 1 to 230 million pounds. Such items as lima beans, snap beans, corn and green peas accounted for 80 per cent of the net reduction in frozen vegetable holdings.

Frozen beef in storage was 8 million pounds less than stocks on hand last month. The 127 million pounds of frozen beef in store was 47 million pounds below average and 25 million pounds less than stocks on hand last year. Total beef in store totaled 141 million pounds, down 10 million pounds from last month. Frozen pork at 363 million pounds on March 1, represents an increase of 24 million pounds over last month. Dry salt pork, up by 8 million pounds, and all other pork reduced by 5 million pounds, brought total pork stocks on March 1 to 612 million pounds. Lard and rendered porkfat totaled 182 million pounds. The net increase of 22 million pounds was more than five times the increase last year.

A net withdrawal of 24 million pounds of frozen fishery products reduced stocks on hand March 1 to 104 million pounds. Current holdings exceed stocks on hand last year by 14 million pounds and are 22 million pounds greater than average. The New England and Middle Atlantic regions held 24 and 22 million pounds, respectively, while in the Pacific area, there were 17 million pounds of frozen fishery products.

Storage Outlook

The trend of below average occupancy in coolers evidenced since last April continues to this date. The level of occupancy reported since April 1948 appears to conform to the occupancy level reported in pre-war. Cooler space utilization reported on March 1 of 49 per cent in public general refrigerated warehouses, while above the March 1940 and 1941 level, approximate that of March 1942. From previous records cooler use should increase next month. The contra-seasonal movement of shell eggs during February explains in part the 3 point decline from February to March in cooler occupancy. This should be the seasonal low, but much will depend upon the movement of shell eggs during March if cooler occupancy is to rise above the March level.

Freezer held commodities should continue to decline for the next two months. The 68 per cent occupancy of March 1, is about equal to the March 1945 level but is well below the space utilization reported in any year since 1943. Historically, freezers show a decrease of 3 to 4 points between March and April. If the maximum decrease should obtain during March, the resulting occupancy on April 1 would approximate the utilization of freezer space reported in April 1945.

Cold Storage Stocks of Frozen Fruits and Vegetables

FROZEN peaches, raspberries and strawberries in storage March 1 amounted to 106 million pounds, according to a report issued by the Production and Marketing Adminsitration of the U. S. Dept, of Agriculture. Of the total stocks on hand, 76 million pounds or 72 per cent were classified as to container size, and 24 per cent of this amount was reported to be in one-pound packages. For individual items 32 per cent of the peaches, 12 per cent of the raspberries and 27 per cent of the strawberries were in retail packages. The ratio of consumer-sized packages to stocks classified for each fruit item has remained unchanged since December 1948. Last year this date, however, 29 per cent of the peaches, 14 per cent of the raspberries and 34 per cent of the strawberries were reported in one-pound containers.

COLD STORAGE STOCKS OF FROZEN FRUITS AND VEGETABLES IN STORAGE MARCH 1 AND FEB. 1, 1949 IN PACKAGES OF ONE POUND OR LESS (000 OMITTED)

	March 1, 1949 Lbs.	Pct.	Feb. 1, 1949 Lbs.	Pct.
Peaches	3,758	32	4,187	32
Raspberries	1,944	12	2,265	12
Strawberries	12,875	27	14,665	27
Asparagus	1,387	49	1,743	54
Beans, lima	13,793	56	15,907	56
Beans, snap	6,805	71	8,245	68
Corn, sweet	4,743	51	5,319	48
Peas, green	24,710	62	27,847	57
Spinach	2,443	72	3,485	77

Packaging data covering 89 million pounds of the six selected frozen vegetables in storage March 1 showed that 60 per cent of the stocks classified as to package size were in retail containers. This compares with 58 per cent last month and 51 per cent last year this date. For such items as frozen asparagus and spinach, that portion reported in consumer containers was 49 and 72 per cent respectively of the total, whereas last month retail packages composed 54 and 77 per cent of the stcoks classified. On the other hand, frozen snap beans, sweet corn, and green peas in one-pound packages were proportionately greater on March 1 than on February 1. Snap beans increased from 68 to 71 per cent; sweet corn from 48 to 51 per cent; and green peas from 57 to 62 per cent. Only frozen lima beans remained unchanged, thus indicating that the out of storage movement during February of retail packages and larger sized packages was proportionately equal.

Refrigerated Warehousing Industry

Summary of 1948 Cold Storage Holdings —Below Average Occupancy

BELOW average occupancy and less foodstuffs in storage than the previous year characterized refrigerated warehousing operations during 1948 according to a report issued by the Production and Marketing Administration of the U. S. Dept. of Agriculture.

Utilization of both coolers and freezers in public cold storage warehouses averaged 5 points below the level of occupancy indicated for 1947. During 1948 average first-of-the-month occupancy for coolers was 65 per cent while for freezers it was 75 per cent. The 65 per cent average monthly occupancy of coolers as reported for 1948 was the lowest since 1942, when the percentage was the same. Average monthly occupancy in freezers during 1948 also showed a tendency to drop below the wartime level but was 4 and 2 points, respectively, above the average for 1941 and 1942. Maximum space utilization for 1948 occured on January 1, the reported occupancies being 74 per cent for coolers and 85 per cent for freezers on that date. Foodstuffs in storage during the year averaged 1.9 billion pounds for coolers and 1.6 billion pounds for freezers. At their peak, in January, cooler stocks totaled 2.8 billion pounds while freezer-held commodities totaled 1.9 billion pounds.

Fruits and Vegetables

The storage of 30 million bushels of fresh apples on January 1, 1948, was high for the year. Stocks on hand during the first half of the year exceeded the quantities reported for each corresponding month in 1947, but during the last quarter storage stocks fell far below those reported in 1947. Fresh pears at their October peak equaled 4 million bushels—3 million bushels below the corresponding peak in 1947.

Frozen fruits in storage reached their highest level on September 1. Of the 372 million pounds of frozen fruits stored on that date, almost a third were frozen strawberries. Frozen vegetables reached their maximum holdings on November 1 with 312 million pounds: These stocks were below the 1943-47 average November stocks by 56 million pounds. Frozen lima beans in storage each month during 1948 exceeded all previous reported stocks since 1937.

Dairy and Poultry Products

Cream in storage during 1948 averaged 38 million pounds per month and at its peak on September 1 totaled 71 million pounds. Creamery butter stocks, at very low levels during the first 6 months of the year, moved into storage in sufficient quantity to bring peak holdings to 98 million pounds on September 1, the greatest quantity since 1945.

American cheese in storage each month during 1948 was greater than in 1947 and at the seasonal peak exceeded last year's peak holdings by 15 million pounds. Total cheese in storage, while generally below average from January to July, exceeded by 10 million pounds the 1943-47 average first-of-the-month stocks from August to December inclusive.

Shell eggs totaled no more than 5.7 million cases (July 1) at any time during 1948. These peak holdings were the second lowest for any year since 1916. Frozen egg holdings on July 1 were 267 million pounds, 20 million pounds below the 1943-47 average July 1 stocks.

Frozen poultry stocks were generally below 1947 monthly holdings during 1948. Monthly average holdings of 172 million pounds were 68 million pounds below those reported in 1947.

Meats and Meat Products

Frozen beef in storage was below average during most of 1948. The 161 million pounds reported on February 1 was high for the year. On that date, total beef in storage was 176 million pounds. This compares with 191 million pounds reported at the seasonal peak on April 1, 1947. Frozen pork, above average most of 1948, reached its highest level on March 1. The 434 million pounds held on that date was a record high. The total pork in storage on March 1 of 700 million pounds exceeded the 1943-47 average March stocks by 178 million pounds.

Effect of Refrigerated Storage On Quality of Popcorn

A STUDY of the effect of refrigerated storage on the popping volume and quality of popcorn is to be conducted under the auspices of the Refrigeration Research Foundation at Iowa State College, Ames, Iowa. J. C. Eldredge will be project leader. This project concerns a product of considerable volume, one that varies in quality and will probably respond with improved quality to better storage.

Studies will be made to determine the following points:

1. The effect of storage temperatures ranging from -25 F. to 50 F., and controlled humidities on moisture content of unpopped corn.

2. The effect of these temperatures and humidities on the popping volume and on quality as measured by taste testing (organoleptic tests).

3. The effect of storage temperatures on moisture content and popping volume of popcorn when placed in storage at higher moisture content than is presently considered.

New Research Projects Announced

AT A meeting of the executive committee of the Refrigeration Research Foundation held in Chicago, February 7, continuation grants were approved for four existing projects (a) Kansas State College, Effects of Freezing Storage Temperatures on Meats (b) Oregon State College, Use of Mycostatic and Bactericidal Agents and Refrigeration for Preservation of Certain Products, (c) Columbia University, Heat Transfer Aspects of Refrigerated Warehouse Packaged Goods, and (d) Chicago University, Investigations of Staphylococcus in Food Stuffs.

Fruit Storage Training Conference

UNDER the auspices of the Refrigeration Research Foundation a fruit storage training conference will be held at Kelowna, Canada, May 2-5. The program will be made up of individual and group discussions under the direction of technical discussion leaders.

Refrigerated Warehousing Industry

Marketing of Prepackaged Apples

THE advantages and disadvantages of marketing apples in consumer-size packages are being studied in a large-scale Federal-State project that got under way recently. The over-all objective of the work is to increase the salability of apples and the efficiency of marketing them. The study is being carried out with the assistance of shippers, distributors and retailers as well as producers.

Cooperating agencies are the Washington State Apple Commission, the Washington Agricultural Experiment Station, and the Marketing Research Branch of the Production and Marketing Administration, U. S. Department of Agriculture. The work is being done under the Research and Marketing Act of 1946 and was recommended by the RMA Deciduous Fruit Advisory Committee.

Since late December, 52 carloads of Winesap apples have been shipped from Washington State to 21 cities in all sections of the country. Additional carloads are being shipped this month. Of the 52 carloads, the equivalent of 30 carloads were prepackaged in 4- and 5-pound flexible transparent film bags. The rest of the apples were shipped in wooden boxes which have been the standard containers for northwestern apples for several years. In most instances, each car had some of both types of containers.

Cost and salability studies also are being made on commercial shipments of Washington apples packed in open-faced cartons and mesh bags. The apples are marketed through regular trade channels, some going direct to chain stores and others moving through the wholesale markets to various types of retail outlets. A post card questionnaire is included in the prepackaged bags of apples. Consumers are asked on the card to indicate what they believe are the good and bad features of the package they purchased.

Changes Proposed in Dairy and Poultry Grading and Inspection

THE U. S. Department of Agriculture has announced proposed changes in regulations governing the inspection and grading of dairy and poultry products. The proposed changes include a provision for the grading of ready-to-cook poultry which has been inspected by personnel under the supervision of cooperating state agencies, provided that such poultry was processed according to sanitation and facility requirements now being developed by the Poultry Branch of the Production and Marketing Administration in collaboration with the poultry industry.

Present regulations governing the authority of the national supervisor of grading services on dairy and poultry products would be changed in order to maintain uniformity of application of U. S. standards and grades for poultry and dairy products on a national basis. Other changes proposed would provide for lower fees for the inspection of frozen eggs and slightly higher fees for the grading of shell eggs.

Consideration will be given to all comments and suggestions received by USDA from the industry and others interested before the changes are incorporated in the rules and regulations of the Secretary of Agriculture covering grading and inspection of dairy and poultry products.

Lettuce Trucked from California

LETTUCE from California is reaching Richmond, Va., and other eastern markets by truck according to a news report. The Agriculture Department said that two trucks recently brought loads of lettuce to the Richmond, Va., market, transporting the produce in refrigerated compartments, the first time California produce has been so transported to this city, the Department said.

New York State Association of Refrigerated Warehouses

THE 36th annual meeting of the New York State Association of Refrigerated Warehouses took place in Rochester, N. Y., at the Hotel Seneca March 17 with approximately 75 members present.

The guest speaker for the occasion was Samuel Fraser, executive secretary of the International Apple Association. William Dalton, executive vice-president of the National Association of Refrigerated Warehouses spoke on the subject "A Quick Look at a Bright Future." Harold Emerson, chairman of the North Atlantic Association, and Charles Watson, president of the New Jersey State Association, put on a panel discussion on "Human Relations are Public Relations."

Edward A. Rogerson of Le Roy, retiring treasurer of the New York State Association, was awarded an honorary life membership in the Association and commended for his many years of service to the organization.

The following officers were elected:

Officers

President, Garth A. Shoemaker, Elmira
First Vice-president, Weston M. Rider, Germantown
Second Vice-president, Frank H. Field, Jamestown
Secretary, Charles G. Ashe, East Aurora
Treasurer, Ralph C. Stokell, New York City

Executive Committee: Richard Doncaster, Holley; William Scott, Rochester; W. Edward Bishop, Sodus; J. C. Posson, Medina; Francis Blake, Albion; Charles E. Eells, New York City.

Legislative Committee: J. R. Shoemaker, Elmira; John A. Verney, Morton; William J. Laack, Brockport; R. L. Meyer, Hudson; Raymond C. Cash, Rochester; Merrill G. Koser, Buffalo; Richard Klinck, New York, and Arthur LaBaie, Hilton.

Canadian Cold Storage Holdings

THE Dominion Bureau of Statistics of Canada, Agricultural Branch, reports the following commodities held in cold storage on March 1, 1949 as compared with March 1, 1948 and February 1, 1949.

Apples in cold storage on March 1, 1949 amounted to 1,352,887 bu. as compared with 1,979,824 bu. March 1, 1948 and 2,090,029 bu. February 1, 1949.

Frozen fruit holdings in storages and factories March 1, 1949 amounted to 14,783,000 lbs. as compared with 11,024,000 lbs. March 1, 1948 and 16,196,000 lbs. February 1, 1949.

Stocks of frozen vegetables in storages and factories on March 1, 1949 amounted to 6,111,000 lbs. compared with 4,708,000 lbs. March 1, 1948 and 7,123,000 lbs. February 1, 1949.

Munitions Board Storage Committees

THE Munitions Board has set up a Storage and Materials Handling Committee consisting of Armed Services personnel only, and it will also create a Packing Storage and Materials Handling Industry Advisory Committee composed only of members of Industry. The warehousing industry will be represented on the Advisory Committee by Albert B. Drake, Lehigh Warehouse & Transportation Co., Newark, N. J.; Vallee O. Appel, Fulton Market Cold Storage Co., Chicago; Fred F. Alford, Alford Refrigerated Warehouses, Inc., Dallas; and Dave L. Tilly, New York Dock Co., New York City. The Armed Services-Commercial Storage Committee, appointed several years ago, has been disbanded.

Air Purification In Refrigerated Storage Rooms

By A. Van Doren

Washington State College and Washington Agricultural Experiment Station, Pullman, Washington

THE extent to which the two important factors of temperature and relative humidity can most effectively be employed in refrigerated storage rooms had been fairly well explored for many types of produce and these facts are generally employed to good advantage by the industry. More recently, considerable study has been undertaken to find out the effect of the nature of the storage atmosphere on fruit. Since fresh fruit is living tissue, utilizing oxygen and giving off carbon dioxide, the concentration of these two gases exert a profound effect on the stored fruit. When the concentration of these two important gases are controlled, the technique is called "controlled atmosphere" storage or as the Britisht refer to it "gas storage." Since there are other emanations, odors, and gases in a fruit storage that may be to our advantage to exercise some control over, a new development referred to as air purification has been undergoing extensive experimentation and commercial testing.

Aim of Air Purification

Air purification in fruit storage rooms is aimed at the reduction in concentration of the naturally evolved gases that come from the stored fruit as well as possibly any extraneous undesirable or foul odor that may be present in the storage air. It has been known for many years that the ripening rate of certain fruits could be stimulated by adding ethylene to their storage atmosphere. Since many common fruits evolve ethylene and possibly other stimulating gases as they ripen it is readily seen that an advantage lies in keeping the concentration of these gases below the level in the storage air at which they exert their harmful or stimulatory effect.

Softening of the fruit tissue and loss of storage life and fruit quality are a direct effect of undesirable gaseous accumulations in the storage air. With some varieties of apples and pears a physiological disorder known as storage scald has long been known to take a heavy toll some seasons. Early work by Department of Agriculture workers demonstrated that some of these scald causing gases could be absorbed by fresh mineral-oil-impregnated paper fruit wraps. Extensive use of this technique has been made by the apple and pear industry. Complete control of scald was not assured, but as a partial control measure, it has had great merit. Adequate air purification not only promises as good protection against storage scald as oiled paper wraps, but it has been shown to extend the storage life of apples by as much as 25 per cent because of reduction in volatiles in the storage air.

The fruit industry has long been aware of this effect of volatiles on fruit. Pear canners have been placing a box of ripe pears in among the green pears to stimulate fast and even ripening. Commercial storages have attempted to ventilate and flush out the accumulated gases in their storages but this has not been a practical solution to the problem. In storages where low temperatures are desired as with apples and pears, it is not economically feasible to refrigerate enough outside air during the warmer months of the year to flush out the gaseous emanations from the fruit.

A number of methods of air purification have been tried at Cornell by Dr. R. M. Smock and his associates to rid the atmosphere of undesirable gases that the fruit gives off. The most practical method yet discovered is to pass the air in the storage chamber through activated coconut shell carbon. This material, which is the same as that used in a soldier's gas mask, picks up the gaseous emanations and holds them very tightly. At the end of the storage season the carbon is removed and is reactivated at very high temperature with superheated steam. It can be re-used for several years if reactivated each year.

Use of Activated Carbon

In the Cornell studies the activated carbon was contained in canisters with perforations in the outer and inner walls. These two concentric cylindrical screens are an effective way to hold the carbon bed. With a ¾ inch thick carbon bed and 1½ pound of 6-14 mesh carbon per canister the storage air is drawn through at the rate of 25 to 35 cubic feet per canister. Smock has shown that four of these canisters per 1000 bushels of apples is sufficient.

An auxiliary blower or fan on the canister unit draws the air through the canisters and delivers it to the air distribution system of the storage chamber. Experiments by Van Doren in Wenatchee, Washington with apples, employed the carbon on trays, but the mechanical difficulties in preventing sag and uneveness of the carbon bed make a very difficult problem. In open horizontal beds there is no way of packing the carbon to uniform density and the weight of the carbon tends to deflect the supporting screen. It was also observed that as more air moved through the thinner portions of the bed the particles in the bed are moved and abraded, thus causing a wearing away of the carbon. The disturbance of the particles initiates channeling of the air through the bed.

The main problem in air purification is to maintain a concentration of gases in the storage air below the point where a significant effect is exerted on the stored fruit. Since the absorption method of air purification is a removal method, it requires that a cycle of circulation through the purifier and throughout the storage be set at a value which will assure the removal of impurities faster than their generation. Smock has pointed out that a minimum of 35 linear feet per minute of air movement past each stored package is required if the volatiles in the package are to be wafted out and if local build-ups in volatile concentration are to be avoided.

Numerous commercial lots of apples were selected as they were harvested and packed for storage in the fall of 1948. Boxes of paired samples were placed in large apple storage rooms where the Dorex canister type air purification was in operation. Duplicate samples were placed in a similar cold storage without benefit of air purification. Inspection on January 8, 1949 in storage showed the following striking results as to firmness shown in Table I.

Using canisters to hold the carbon, and moving 35 cubic feet of air per minute through each, Bartlett pears were stored when they had attained a fruit pressure test of 17 pounds on flesh using a 5/16 inch pressure tester. Bartletts stored immediately after harvest in 1948 with or without harmone stop-drop sprays did not develop any core breakdown during the ripening after 90 days in air purified storage, but all other tests developed core breakdown as shown in Table II. Some core breakdown developed in

Report presented at annual meeting of Refrigeration Research Foundation.

TABLE I—EFFECT OF AIR PURIFICATION VS. STANDARD COMMERCIAL STORAGE ON SEVERAL LOTS AND VARIETIES OF APPLES AT WENATCHEE, WASHINGTON, JAN. 8, 1949

Variety	Lot 1	Lot 2	Lot 3	Lot 4
Common Delicious				
Air purification	13.75*	15.6	15.23	14.7
Checks	12.1	13.7	12.6	12.4
Red Delicious				
Air purification	15.10			
Checks	13.56			
Romes				
Air purification	17.6	15.7		
Checks	16.5	13.4		
Golden Delicious				
Air purification	12.4			
Checks	10.6			
Jonothans				
Air purification	12.90	13.25		
Checks	11.06	12.03		

*These figures are the average pressure test of ten fruits from each test lot. A Magness Taylor pressure tester was used. Thirty presses on the ten apple samples were made. The skin was sliced off an area about the size of a nickel for each press. A 7/16 inch plunger on the pressure tester was used.

commercial cold storage even though the fruit was stored immediately with or without harmone stop-drop sprays. A delay in time between picking and time of being placed in storage started ripening processes in the fruit that no storage treatment could arrest.

Odors in Cold Storage Rooms

There are occasional odor problems that develop in some rooms. These may arise from a number of sources and may impart an unpleasant or undesirable flavor to the stored fruit. Excessive surface molds growing in the storage may give an "off-flavor" to the fruit. Such molds can be controlled by careful control of humidity, good plant sanitation, or the proper use of ozone. Some building materials may give off enough foul odors to contaminate the fruit.

TABLE II—CORE BREAKDOWN IN BARTLETTS

Treatments	Percent core breakdown after 90 days storage at 32F. and after ripening at 70F. following storage period.
Imm. Comm. Stg., No Hormone	3
Imm. Comm. Stg., with Hormone	5
Imm. A. P., No Hormone	0
Imm. A. P., with Hormone	0
48 hr. delay, comm. Stg., No Hormone	5
48 hr. delay, comm. Stg., with Hormone	10
48 hr. delay, A. P., no Hormone	6
48 hr. delay, A. P., with Hormone	8
96 hr. delay, comm. Stg., no Hormone	9
96 hr. delay, comm. Stg., with Hormone	16
96 hr. delay, A. P., no Hormone	20
96 hr. delay, A. P. with Hormone	50
9 day delayed harvest, comm. Stg., with Hormone	54
9 day delayed harvest, A. P. with Hormone	27

Note—Imm. Comm. Stg. means immediate storage in a commercial cold storage room at 32F.

A. P. indicates air purification plus standard cold storage at 32F.

These odors should be avoided rather than trying to remove them, but many such odors can be reduced to the point where they no longer are a problem, by air purification with activated carbon.

Many mixed product odors such as cabbage, apple, onion and potatoes can be abated to the point where cross contamination fails to occur, but the problem is more logically solved by avoiding it. Studies at both Cornell and Purdue are providing answers to some of these problems.

The cost of air purification when judged in the light of what it can accomplish is not high. Equipment and the

(Continued on page 69)

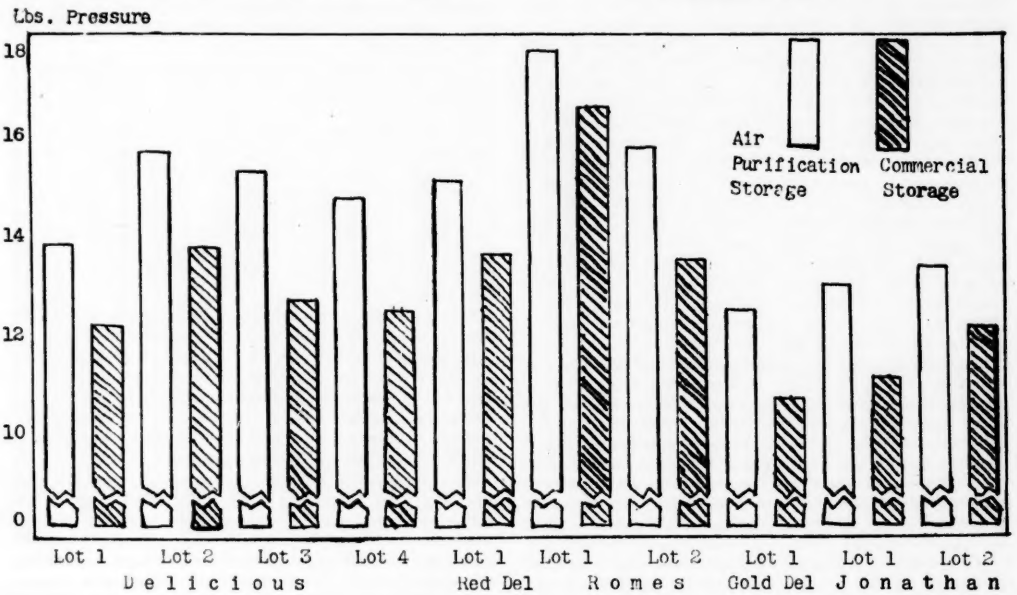


Fig. 1—Chart showing effects of air purification storage versus commercial storage on the maturity of different varieties of apples during three months storage.

Palletized Operations in One-Story Warehouses

By W. O. Thompson Jr.
Modesto Refrigerating Co., Modesto, Calif.

This paper, presented at the 58th Annual N A R W Convention, illustrates and describes three conventional types of one story warehouses — ground level, dock level and combined ground and dock level, from their adaptability to use of fork truck and pallets.

IN ANY discussion of palletized operations in a one-story warehouse, a consideration of various types of plant layouts would seem essential. We realize, of course, that all warehouses do not handle the same basic commodities and that this dictates different handling problems. We have consequently illustrated three types of one-story plant layouts which lend themselves in some measure to a variety of handling methods.

Ground Level Plant

The first (Fig. 1) is a ground level plant of simple design showing a profile and a floor layout. You will note it consists of a single bank of rooms all opening on the outboard sides to large ground-level paved areas. One side is for truck use and the other, with tracks running down the center, is for railroad cars. The handling of merchandise on pallets off the trucks and out of the cars is illustrated in the cross-section. This is the type of operation that lends itself very nicely to high temperature storage where there is considerable and rapid movement of large quantities of merchandise in and out of storage. It is the least expensive construction as far as design is concerned and lends itself to an extremely economical operation.

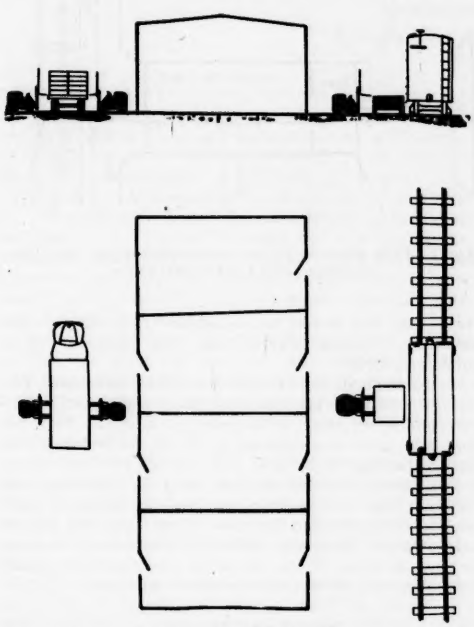


Fig. 1—Layout of a ground level warehouse operation.

One of the most important features in any operation involving fork trucks and pallets is to allow the machines full mobility to do the work. There is no question but what fork trucks can handle merchandise at fantastically low cost per ton figures, but this can only be achieved by removing all barriers and making the path of the machine the most simple and direct possible. Apply that dictum to Fig. 1 and note how the truck moves direct from the point of unloading into storage and vice versa. The distance to travel is also at a minimum. In fact, this particular operation is so simple that its functional utility can be easily overlooked.

Dock Level Warehouse

Fig. 2 illustrates a dock level warehouse. This type can be used where climatic or other conditions prevent the construction of ground level plants. The handling of merchandise from railroad cars is somewhat facilitated by having a car-height dock to work off. If the railroads ever design a car that a fork truck can move into and out of quite freely, this dock will be a big advantage over the ground level method. The unloading of trucks on the front dock will of course be accomplished with the use of pallets on dollies. As in the layout in Fig. 1, the movement into storage is short and direct. The principal fault in this design is the lack of facilities for the quick unloading of pre-palletized truck loads.

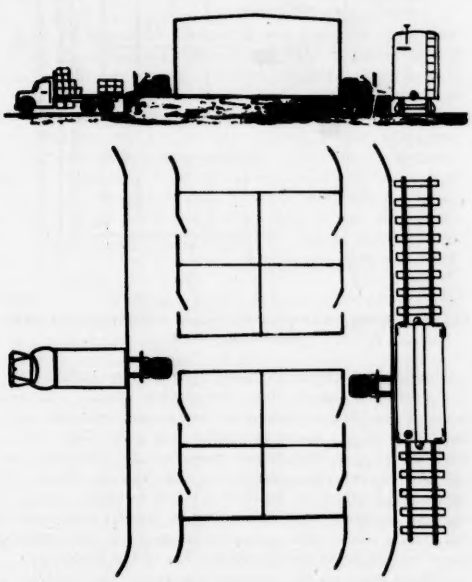


Fig. 2—Layout of a dock level warehouse operation.

Combined Ground and Dock Level Plant

Fig. 3 is a combination of the advantages of both the ground level and dock level plants with a more elaborate layout of rooms and corridors. Its chief drawback is the longer and more indirect haul. However, when considerable quantities of frozen merchandise are to be handled, a design somewhat along these lines would be recommended. The dock and ramp facilities are such as to handle all types of trucks and loads. The halls make excellent consolidation and breakup spots for the making up of orders, and the long insulated corridors along the back, which is in reality a carloading dock, give added protection and quality control in the loading and unloading of frozen commodities to the cars.

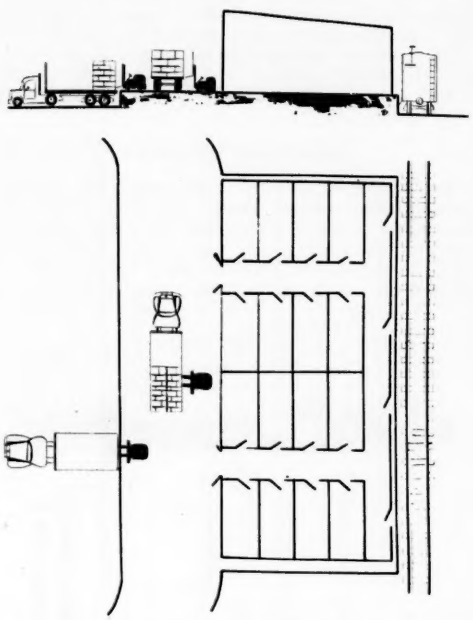


Fig. 3—Layout of combined ground and dock level warehouse operation.

Other modifications of these types can be worked out to suit particular needs, but any design should primarily consider the basic principles of mechanized material handling. That is, (1) speed in loading and unloading, and (2) the shortest and most direct movement to and from storage. Any warehouse construction that violates these principles in an effort to achieve a lower building cost is of doubtful economy, for the saving in construction costs is made only once. The extra handling costs are repeated every working day for the entire life of the building.

If these methods of operation are sound for a particular warehouse they should then be carried beyond the immediate warehouse walls and applied however control or influence can be exercised. To illustrate this point, chart the flow of a given commodity, not just through your own warehouse, but from its point of inception and see if somewhere along the line its movement can be made faster and more direct. Fig. 4 shows, in a small way, the case in point. Here you see a processing shed linked to a warehouse by a long concrete ramp. Follow the complete flow of the products, which are on pallets and handled by fork

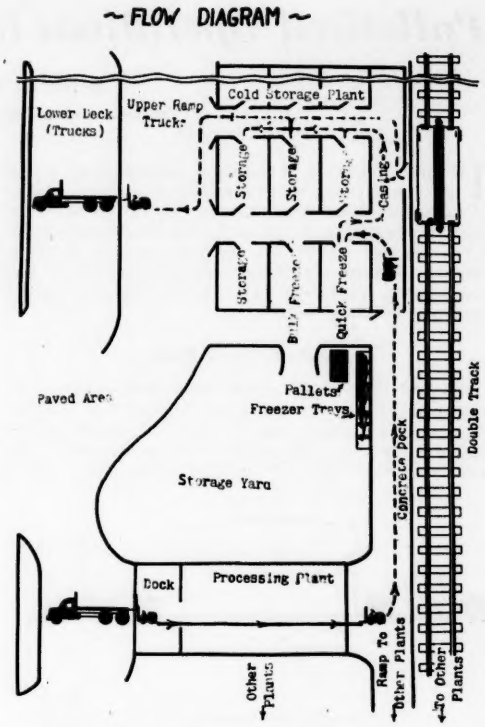


Fig. 4—Flow diagram of processing shed linked by a long concrete ramp to the warehouse.

trucks with few breaks and rehandles, right through the processing, freezing, warehousing, and shipping. It is simple and direct.

Similar methods can be applied to other operations. For example, the materials handling advantage gained if the merchandise we store could come to us in the form we store it in, is at once apparent to all. If, for instance, you are a palletized plant, have your storage products arrive at your docks all palletized and ready for unloading and storage. The co-operation that can be achieved with trucking companies and customers along these lines can be truly amazing, especially when it is pointed out to them the loss involved in the tie-up of expensive equipment during the busy season with delayed unloadings.

Speed and Mobility

If there is any advantage in the palletized one-story style of warehousing over another it is to be gained through this increased speed and mobility in the handling methods. The field of operations is broad and the problems are not all simple. In many instances one set of headaches is only traded for another. The detail of placing the merchandise on pallets and their storage in the warehouse without loss of load factor are often quite complicated and involved. New products and different containers in various shapes and sizes are continually presenting problems that tax the warehouseman's ingenuity to the uttermost. None of them, however, are insurmountable and their solution can and will pay large dividends in the form of lower handling costs.

Frozen Foods
Reg. U. S. Patent Office
COVERING EVERY PHASE OF THE QUICK FREEZING OF PERISHABLE FOODS—PREPARATION, PACKAGING, FREEZING, STORAGE, DISTRIBUTION, DESIGN, CONSTRUCTION, EQUIPMENT, OPERATION OF LOCKER PLANTS.

Orange Juice Concentrate—Its Rise as an Important Frozen Food Product

By Ambrose E. Stevens
Vice-president, Vacuum Foods Corp.

TWO years ago, when quick-frozen concentrated orange juice was first marketed on a commercial scale, it seemed to have in common at its birth one thing in particular with the birth of other quick-frozen foods, that was, nearly everybody agreed that it could not succeed.

And there were some pretty good reasons for this opinion. Concentrated orange juice (so-called hot concentrate) had been on the market for years, but it was a product seemingly suitable only for bottlers of five cent drinks. Frozen orange juice single strength, had been sold in small quantities for years, but it never had much popularity beyond the institutional field.

Sales of canned citrus, having grown enormously during the war, had fallen into the doldrums. Wholesale grocers were taking some pretty big inventory losses, and it's painful to remember what wholesale distributors of frozen foods had to do with their frozen grapefruit segments and tangerine segments.

Little wonder then, that quick-frozen concentrated orange juice was not very enthusiastically received by the trade at first. In fact, we packers, just one year ago, were hopeful that we might be able to get the sale of this product in time up to an average of one dozen per store per week.

Packers, distributors and retailers were astounded last spring and in the early summer in observing the remarkable acceptance by the public of this new product. Sales reached and remained at such unpredictably high levels that the pack was pretty well sold out before the end of the summer.

Increase Production

During the past six months, there has been a great rush to increase production. New packers sprang up in California, Florida; packers doubled and trebled their production capacities. New packers have entered the field in Florida.

The average yield of oranges in the United States is about as follows:

Florida	64,000,000	90 lb. boxes
California	45,000,000	90 lb. boxes
Texas	5,000,000	90 lb. boxes
Arizona	1,000,000	90 lb. boxes
Total	115,000,000	90 lb. boxes

I have no figures on California, but a conservative estimate of Florida oranges going this year to quick frozen orange juice concentrate is 10,000,000 boxes or about 15 per cent of the entire crop of the state, and the product is only in its second sales year.

Why has the public taken such a fancy to this new product? Several reasons are manifest. Quick frozen concentrated orange juice, with almost the same convenience as canned, gives the public the flavor of fresh. By and large, the frozen juice is more uniform than fresh. For about nine months of the year, the frozen juice is cheaper than fresh. And last but not least, the frozen juice has equal vitamin content with fresh.

Why has quick-frozen concentrated orange juice found favor with distributors and retailers? This product added to volume and new profits to frozen foods without duplicating or supplanting volume and profits already enjoyed. Although orange juice enjoys a steady year around sale, its peak consumption is in the summer months. Last year, orange juice went a long way to offset the conventional summer slump in frozen foods sales. We had many distributors tell us that they had the largest months over-all business in their history during last summer. Undoubtedly orange juice was a big help. We had many retailers tell us that many consumers during the summer went to the frozen foods cabinet to buy orange juice, but purchased other frozen items at the same time which they would not normally do during the peak of the fresh fruit and vegetable season.

Until now, most of the packers of orange juice have well recognized the fundamental principle of frozen food processing, namely top quality and top quality only can succeed. For this reason, the public has been buying quick-frozen concentrated orange juice with confidence, and repeat sales grow and grow day by day. As long as orange juice packers stick closely to the policy of packing only top quality, the sales volumes of the product will continue to expand. It is not necessary for orange juice to repeat the

Presented at 1949 annual convention National Wholesale Frozen Food Distributors Association.

war time experience of other frozen foods, when the departure from packing only the best brought so much distress to this industry.

Quality Control

Like other frozen foods, quality production of orange juice requires first the determination on the part of the packer to produce to quality, second, it requires the right type of concentrating and other equipment, third, it requires careful selection of raw material, and fourth, it requires scrupulous quality control including plant sanitation.

Not that, even with the most strenuous efforts on the part of the packer, there will not occasionally arise some few consumer complaints. By the very nature of the raw agricultural material from which it is made, orange juice like other frozen items will occasionally turn up an off-color package. But with proper quality desires on the packer's part, and proper protective handling on the distributor's part, consumer troubles can be and are infinitesimal in number.

The outstanding characteristic of quick-frozen concentrated orange juice is its fresh like flavor. If it does not taste like fresh, it is little better than canned single strength and costs more.

Orange juice is a very heat sensitive product. To maintain fresh flavor and vitamin C content, concentration must take place at relatively low temperatures. Otherwise flavor is vastly impaired. So-called hot concentrate, or a concentrate made by driving off the water at high temperature, is generally described as having a cooked taste. In any event, even though palatable, it does not taste like fresh juice.

There are in use today several systems of cold concentration, which are approved for making quick-frozen concentrated orange juice of high quality. Naturally, each packer thinks the system he is using is the best. This equipment is costly, and considerable technical know-how is required to operate them properly.

Orange juice, like all packaged grocery items including frozen foods, has to be well advertised, aggressively promoted, and energetically distributed. Otherwise it is just another item. Sales by cities today reflect in almost exact ratio the amount of public education that has been given in behalf of the product. Orange juice just does not get up and walk out of the cabinets.

Retail Cabinet Space Short

A current serious handicap to increasing orange juice sales is lack of cabinet space at the point of sale. Only time and the purchase of more adequate equipment on the retailer's part can materially overcome this difficulty. We do believe that retailers should give more attention and cabinet space to stocking, fast, volume turnover items and less or no space to slow sellers.

Of all products in frozen foods, orange juice is the only one that the public uses every day. You see consumer after consumer buying six cans at a time for a week's requirement. Is it any wonder then, that in many stores orange juice already is the largest single selling product in frozen foods?

We do not believe we are fantastic when we think that the sale of quick frozen concentrated orange juice will equal or exceed the sales of all other frozen foods added together. It would appear that one thing and one thing only can prevent the fulfillment of this concept, that is poor quality. Many of us in the business are pledged to see that this will not happen.

Trends In Frozen Food Distribution

By Philip Lyons

PictSweet Foods Inc., Mt. Vernon, Wash.

HARDLY had the frozen food business gotten well underway when the advent of World War II led to unexpected changes in the entire frozen food pattern. The business mushroomed as a result of frozen foods being favored by ration points. There was an enormous demand for the well known staple products as well as entirely new items which had never been frozen before. A great many packers, distributors and retailers went into the frozen food business that were not really justified in doing so based on normally competitive market conditions. Consequently, it was natural that when the war-time influence began to disappear there developed a great breaking down process.

This is true not only of distributors but also of packers and retailers. It has been a situation of the survival of the fittest. Those not able to meet the competitive conditions of peace-time business have passed out of the picture. The survivors have proved their fitness to be in this business on a long term basis. Tougher, but more normal times are ahead and it will be a continual process for us all to prove by our efficiency and service that we merit our respective positions within the food industry.

The business experts, the economists, the Washington statistics and the activity of the stock market and other industries indicate that we are going to have a tougher but probably more normal period ahead of us to sell in. It is going to be a period where consumers are going to watch their buying dollar more carefully when the breakeven points for manufacturers, retailers, and distributors are going to be higher than they ever have been before. This trend will affect every factor in the frozen food business whether it is the packers, distributors, or the retailers, or those who handle the goods in-between times.

Trend at the Packer Level

There have been and also will be further changes at the packer level. A relatively large number of packers of frozen foods have already passed out of the picture. Those who have survived are, by and large, the larger producers and those who from the very beginning have had a high standard of quality and manufacture and standardization of product, and packaging. And this to a point where the buyer right down to the consumer realizes the quality and value that he is now getting from the packer.

There may even be a greater centralization of this business into the hands of a few packers. Further, as time

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Presented at 1949 Frozen Food Convention, Chicago, Ill.

goes on, the business may easily concentrate more and more into the hands of those few who have created a demand for their brand and who have put out a standardized product with a good label and which gives the consumer utmost quality and value and the type of product he and she wants.

In the days when the well known brands were short a great many manufacturers had a market for goods but now that market does not exist, as the well known brands are in full supply. If you will recall your reactions looking at frozen food cabinets compared to 4 or 5 years ago, I am sure you will agree that there are increasingly fewer brands in the boxes. Obviously, the manufacturers whose frozen foods previously got into those cabinets, based on the shortage of items, are no longer there.

After all we are working with a "shelf area" (as we would call it in dry groceries) of a very small number of square feet in connection with frozen foods. But those small number of square feet have a high profit potential. This profit potential, considering the low inventory value and rapid turnover, is probably greater than a high percentage of the total square feet of selling space within the retail stores. Because of this, only those stable items of frozen foods under accepted brands and which offer consumers highest quality and value should merit position in the cabinets.

This does not mean that there is not a place in the American market for the enterprising packer who has a new product that really gives the consumer something he or she wants. I need do nothing else but refer to the gross within the last year or two of the frozen orange juice concentrate business to indicate this. There are equal opportunities for other products and packers.

Any packer who can offer a new frozen food at the proper price, attractively packaged and which fills a definite consumer want or convenience is going to find a market for his goods. One of the greatest needs along this line is to build up the consumer sales of frozen food distributors and retailers. Any item such as orange juice that will sell in volume through frozen food cabinets does a great service, not only to the distributor, but to the retailers and the whole frozen food industry.

Standardization of Pack

A great deal of work is also being done at the packer level in regard to standardizing identity and quality for various grades of frozen food goods. There has been much progress on this within the industry, as well as by government agencies, to a point where this year's pack is more standardized than last year's. Next year's pack will be better and more standardized than this year's pack, to a point where the consumer will definitely recognize just exactly what quality and grade of goods he or she is getting.

Another trend at the packer level are the changes in packaging going on right now. The packaging engineers and packaging designers are having a heyday. Old established brands as well as new, who want to grow, are establishing new standards and new designs for their label to make them more attractive and which offer more "pick-up" appeal for the consumer looking into the frozen food cabinet.

It is also true that some packers are standing pat on their labels. Still others, who have long pioneered attractive labels, are staying with theirs. Others who feel there can be improvement, are making changes. The trend is to improve the label or vignette not only by words, but by picturization of the product either in its natural state or in attractive dish settings. Stronger name registration on the package has also become more important than heretofore.

There is obviously very little opportunity for any personal selling to the consumer out of a self serve frozen food cabinet. By and large the consumer will take the brand she wants. All of us know this and by and large the attractiveness of the label, the identity of the item and the stronger dominance of the brand name, are the factors which influence the rate at which each product will sell. This is following the same kind of trend which exists in the consumer preference in dry grocery products and packages. With the present fast trend toward self-service in grocery stores throughout the country, manufacturers of and food packers realize their great need for the most attractive labels and packages.

Trends at Wholesale and Retail Level

All factors in the industry are now thinking of how much costs to consumers can be lowered. Frozen food distributors are setting more efficient "breakdown" or order assembly rooms. Efforts are being made to get retailers to concentrate their sources of supply among fewer distributors thus saving the retailer time and securing better service for themselves. The increased order value gives the distributors a better opportunity to operate more efficiently and with some semblance of profit.

We must all continuously prove the efficiency and need of our function within the food industry picture. Frozen food distributors are daily doing just that!

The frozen food distributor has performed his function efficiently and well. His functions are basic in the industry and represent costs which cannot be avoided. These costs, proper refrigerated storage and store delivery and special retail cabinet service, are fairly fixed and separate from costs of similar functions for dry groceries.

Frozen food distributors have long proved this need and efficiency and yet as all of us (the packer, the distributor and retailer) must continue to share in the ceaseless efforts to get frozen foods to the consumer at the lowest possible prices.

1950 Frozen Food Convention Will Be Held at Congress Hotel, Chicago

THE all-industry 1950 convention of the National Frozen Foods Industry will be held at the Congress Hotel, Chicago, Ill. This announcement was made at the final session of the Frozen Food Industry Convention held in Chicago, March 6 - 10. It was also announced that no show will be sponsored in connection with the convention. Sponsorship of the 1950 convention will be undertaken jointly by five associations representing all segments of the industry which conducted the 1949 convention and show. These associations are: National Frozen Food Packers Association. National Wholesale Frozen Food Distributors, National Preservers Association, National Association of Refrigerated Warehouses, National Food Brokers Association.

National Frozen Food Week

SPONSORED by the National Wholesale Frozen Food Distributor's Association, the week of May 14-21 will be devoted to nation-wide boosting of frozen foods. Refrigerated warehousemen are invited to tie-in with this industry-wide project by using their advertising and publicity approach to local newspapers to tell the story of their extensive capacities for out-of-season delicacies that will delight the public in subsequent months.

A. S. R. E. Announces Boat Cruise For Annual Spring Meeting

DEFINITE plans are announced by the American Society of Refrigerating Engineers for the 36th annual spring meeting to be held aboard the SS Richelieu on a five-day cruise down the St. Lawrence River from Montreal. The cruise which will start Sunday, June 5, will end at Montreal following breakfast Thursday, June 9.

Reservations are now being accepted for A. S. R. E. members and their immediate families. The names of non-members wishing to go on the trip will be placed on a waiting list and they will be accommodated if there are any cancellations, according to M. C. Turpin, secretary.

The program will include three technical sessions aboard ship, also a dinner dance, sight-seeing tours, and inspection trips. Technical papers to be presented have not yet been announced but the general program has been arranged as follows:

SUNDAY, JUNE 5

Noon—SS. Richelieu leaves Montreal and starts down the St. Lawrence.

Afternoon—Committee meetings.

Evening—General reception, meeting of council.

MONDAY, JUNE 6

Morning—Short stop at Quebec, followed by the first technical session.

Afternoon—Two-hour stop at Tadoussac for sight-seeing in old French settlement at the mouth of the Saguenay river.

Evening—Second technical session, followed by dancing, while the boat proceeds up the Saguenay river and drops anchor at Bagotville about 11 p.m.

TUESDAY, JUNE 7

Morning—Inspection trip to the Arvida plant of the Aluminum Co. of America and sight-seeing through the remote Canadian back country around Bagotville, Arvida and Chicoutimi.

Afternoon—Third technical session begins after the boat starts back down the Saguenay.

Evening—Dinner dance.

WEDNESDAY, JUNE 8

All Day—Fourteen hours of sight-seeing in and around the city of Quebec. The cruise is resumed at 8 p.m.

THURSDAY, JUNE 9

Morning—Arrive in Montreal at 7 a.m. and the meeting cruise ends following breakfast.

Refrigeration for Meat Packing Plants

DETAILS on the design, construction, and operation of carcass coolers for meat packing plants are covered in the latest pamphlet of the Application Data series issued bimonthly by American Society of Refrigerating Engineers.

Entitled "Meat Packing Plant Refrigeration, Part 1, Carcass Coolers" and designed AD 45, the 10-page pamphlet is divided into four major parts: (1) Beef Carcass Chilling Coolers by J. S. Bartley of Rath Packaging Company, (2) Beef Carcass Holding Coolers by K. E. Wolcott of Wilson & Company, (3) Hog Carcass Chilling Coolers by J. P. McShane of Swift & Company, and (4) Chilling Coolers for Lambs and Calves by J. P. McShane. Mr. McShane is also chairman of the joint ASRE-American Meat Institute Committee which prepared this AD Section. The Bulletin is profusely illustrated with drawings and sketches showing various type coolers and circulating systems. Copies may be obtained from ASRE headquarters, 40 West 40 Street, New York 18, N. Y.

Chicago Section, A.S.R.E.

THE regular March meeting of the Chicago Section, American Society of Refrigerating Engineers was held Thursday evening, March 10. "Scraped Surface Heat Exchangers" was the subject of the paper of the evening presented by F. P. Shannon, engineer of Henry Vogt Machinery Corp., Louisville, Ky.

Special problems have had to be solved in the oil refining industry, involving the "cracking," "fractionization," and "de-waxing" processes of erstwhile advertising fame. Some wax crystals begin to form at or below 80 F, a simple heat exchange is the basis for these processes. However, the formation of wax on the inside of the inside pipe of a double-pipe exchanger results in two detrimental effects: (a) the constriction of the flow area of the pipe, and (b) the insulating effect of the wax which retards the exchange of heat (wax has a thermal conductivity 4½ times that of cork).

Refineries have now largely standardized on a "scraped-surface" heat exchanger to overcome these problems. The typical unit consists of a series of twelve 6-in. pipes through which the oil flows, within 8-in. pipes through which refrigerated brine flows. The pipe lengths are 44 feet. Within each inner pipe is a series of spring-loaded scrapers similar to lawn-mower blades which are driven by chain-and-sprocket arrangement at about 20 rpm. The spring-loaded scrapers have replaced an earlier helical type which literally "bored" a hole through the crystallized wax. A comparatively recent development is the direct-expansion chiller using propane as the refrigerant. The arrangement here is usually two 27-in. x 33-ft. shells within each of which is installed seven 6-in. pipes.

Mr. Shannon concluded his talk with an outline of many possibie applications in other crystallization processes and answered a host of questions.

Desiccant Standards Committee Formed by A.S.R.E.

AN ASRE Standards Committee has been established, for the purpose of setting up rating and testing standards of desiccants, by the American Society of Refrigerating Engineers. The first meeting of this Committee was held in Washington, D. C., during the Annual Meeting of the Society last December.

To date there is no accepted method for rating and testing the many desiccants or refrigerant dryers which are marketed under many trade names. Many purchasing agents as well as government buying departments have expressed the need for a uniform method of judging the drying efficacy of various desiccants.

The Committee is now studying the many published articles and technical data available on desiccants and the Chairman, W. O. Walker, enlists further suggestions from engineers in the industry who are familiar with drying problems. Unpublished information is also requested since it is felt that a great deal of such data exists in the files of the industry.

The size of the task facing the Committee clearly indicates that standards can be arrived at only after exhaustive study. Considerable experimental work will be necessary and for that reason participation of industrial and academic laboratories are requested.

The Committee is made up of the following members: W. O. Walker, chairman, Ansul Chemical Co.; L. H. Bartlett, Louisiana State University; R. E. Cherne, consulting engineer, Rochester, N. Y.; W. A. Pennington, Carrier Corp.; W. F. Wischmeyer, Sporlan Valve Co.; R. L. Williams, Kinetic Chemicals Inc.; and P. L. Veltman, Davison Chemical Co.

597 Million Dollars Added to Value of Refrigeration Machinery in 1947

MANUFACTURERS in the refrigeration machinery industry showed a value added by manufacture during 1947 of $597.5 million, an increase of 306 per cent over the $147.0 million shown in 1939, according to preliminary figures released by the Bureau of the Census, Department of Commerce. Value added by manufacture is calculated by substracting cost of materials, supplies, containers, fuel, purchased electric energy, and contract work from the value of products. For some purposes, particularly for comparing one industry or group of industries with another, it is the most satisfactory Census measure of the economic importance of an industry.

TABLE I—GENERAL STATISTICS FOR THE REFRIGERATION MACHINERY INDUSTRY, UNITED STATES TOTALS: 1947 AND 1939
(Money Figures and Man-hours in Millions)

Item	1947	1939
Number of establishments	561	343
All employees:		
Number (average for the year)	129,290	n.a.
Salaries and wages (total)	$380.2	n.a.
Production and related workers:		
Number (average for the year)	108,316	39,433
Man-hours (total)	220.0	n.a.
Wages (total)	$299.2	$54.7
Value added by manufacture[1]	$597.5	$147.0
Expenditures for new plant and equipment	$46.1	n.a

n.a. Not available.
1 For 1947, partly estimated by subtracting cost of materials, fuel, electricity, and contract work from value of production calculated by multiplying quantity produced by unit value of shipments. For 1939, value of production less cost of materials, fuel, electricity, and contract work.

The average number of production and related workers in the industry mounted to 108,316 in 1947 as compared with 39,433 in 1939. Wages paid to production workers increased 447 per cent, from $54.7 million in 1939 to $299.2 million in 1947. The industry's expenditures for new plant and equipment during 1947 totaled $46.1 million.

The total value of shipments and cost of materials data are not shown in this release due to the extensive duplications resulting from the use by some establishments of such products as compressors and condensing units produced by others in the same industry.

This industry comprises establishments primarily engaged in manufacturing mechanical and absorption refrigerators for commercial, industrial, and household use, refrigeration machinery, ice-making machinery and equipment, refrigerated show cases and cabinets and complete air conditioning units for domestic, commercial, and industrial use. Also included in this industry are establishments manufacturing coin-operated refrigerated beverage dispensing, ice cream dispensing and other types of refrigerated merchandising machines.

These statistics are derived from a preliminary tabulation of manufacturers' reports in the 1947 Census of Manufactures. Final and more detailed figures will appear in the Census publication, "Service-Industry and Household Machines," which will be published and offered for sale by the Superintendent of Documents in the near future. Similar preliminary and final releases will be issued for other manufacturing industries during the next few months. Totals for the United States and for each of the States will be issued in April. These will be followed by detailed statistics for States, metropolitan areas, counties, and cities.

TABLE II—GENERAL STATISTICS FOR THE REFRIGERATION MACHINERY INDUSTRY, BY STATE, 1947
(Money Figures in Millions)

Item	United States Total	Ind.	Mich.	N.Y.	Ohio	Pa.	All Other States
Number of establishments	561	19	43	82	31	52	334
All employees:							
Number (average for the year)	129,290	20,672	18,212	6,201	30,353	18,192	35,660
Salaries and wages (total)	$380.2	$60.5	$54.0	$18.4	$96.4	$50.0	$100.9
Production and related workers:							
Number (average for the year)	108,316	17,090	16,079	5,117	26,034	14,327	29,669
Wages (total)	$299.2	$47.7	$45.6	$13.6	$78.4	$37.2	$76.7
Value added by manufacture[1]	$597.5	$100.9	$102.4	$26.5	$134.8	$72.0	$160.9

1 Partly estimated by subtracting cost of materials, fuel, electricity, and contract work from value of production calculated by multiplying quantity produced by unit value of shipments.

Air Purification in Refrigerated Storage Rooms

(Continued from page 62)

annual reactivation of the carbon when prorated over a five-year period need not exceed more than ¾ cents per cubic feet of storage space per season.

Judging from the experiences we have gained this far in our air purification trials in apple and pear storages, we should keep in mind that the equipment and its operation as well as the type and quantity of carbon used must be fitted for the job. A good grade of activated coconut shell carbon is indicated. Particle size of the carbon granules should be in the range of 6-14 mesh freshly activated each season. Air movement through a ¾ inch bed of carbon provides efficient removal of gaseous molecules with velocities of air up to 25 cubic feet of air per pound of carbon used. There must be uniform distribution of air as it moves through the carbon bed.

There must be a good air distribution throughout the room and among the stacks of stored fruit. It does no good to purify the air in the aisle only, or to install equipment that is not capable of reducing the impurities faster than their generation. Do not expect the impossible from air purification. Fruit that is overmature, or permitted to ripen due to improper storage temperatures cannot be aided with air purification. Dr. Smock has conclusively shown that any considerable delay in placing the fruits under conditions of air purification rapidly puts those fruits in to a condition where subsequent air purification produces little or no effect on the fruit.

The treatment should always start promptly after the fruits are harvested and placed in storage. Cooling of the fruit should proceed as rapidly as refrigeration facilities will permit until the fruit has attained the optimum core temperature for its best keeping in storage. The volatile emanation from the fruits are almost directly proportional to the respiratory activity and such activity is most effectively reduced by minimum core temperature promptly following harvest.

New Refrigerator Cars Ordered

AN ORDER has been received by the Pacific Car & Foundry Co., Seattle, Wash., to build 500 refrigerator cars at its Renton plant. Deliveries are expected to be made during spring and summer.

Member Activities

(Continued from page 50)

Two films on selling methods furnished by Burge Ice Machine Co., completed the program. These films gave much information which proved very helpful not only to salesmen, but also to the other members.

President Reid read a letter he had received from David Feldman, member-at-large from Haifa, Israel who had visited the chapter during February. His letter in part was as follows:

"I very much appreciated your kind reception and hospitality tendered me as a guest of the Chicago Chapter of NAPRE during my visits to your meetings. It is not a joke. 'that I did not feel the cold while in Chicago.' I was warmed up by your friendly and congenial behaviour, keen interest of the members in my problems and their cooperation in solving them.

"It was so nice for a stranger to see and feel the warmheartedness of your meetings and to understand the benefit which arises from the contact and exchange of opinions of the members and especially from the knowledge of such fine speakers and commentators as Eugene Rytlewski and others.

"I will be pleased to tell my people in Israel about the help and interest which I received from the members of NAPRE and I am sure that they will also appreciate it all.

"Please convey my regards to all the members of the chapter, especially to Eugene Rytlewski, Jay Watson, Arthur Clementson, Douglas Benton and LeRoy Hinkey. I also wish to extend my most sincere thanks to you Mr. Reid for the kindness you showed me during my visit to your plant at the University of Illinois. My letter would not be complete if I did not acknowledge with gratitude the exceptionally kind hospitality I received from Emerson Brandt and his family. In closing I again express my sincere thanks to all of you."

DAVID FELDMAN, *Member-at-Large*

Applications for membership were received from Floyd J. Rose, Association of American Railroads; Harold W Michler and John T. Whitson, both of Westerlin & Campbell Co.

There was a discussion of the method of arranging for Ladies Night. By common consent it was decided to hold this affair on May 17 and Leslie Clifford, LeRoy Hinkey and Eugene Rytlewski were appointed a committee to make the necessary arrangements.

In the instruction period of the second meeting, Eugene Rytlewski discussed compressor valves. He analyzed the characteristics of the valves which had been utilized on older slow-speed machines and followed with a discussion of modern valves required to produce best efficiency in present day high speed machines.

Sound slide lectures were given on the York turbo refrigerating machines and ice cube makers. These well-illustrated lectures described the design and operation of their equipment and discussed the applications on which it has been utilized.

New Orleans

BY FRANK GILLIO

The recent visit to the plant of the Lone Star Cement Co. proved most interesting to 50 members and a number of guests of New Orleans Chapter. The visitors were conducted through the plant and the operation fully explained by Supt. Deadman and his assistants. All present expressed their appreciation as it was the first time that most of the members had seen a cement plant in operation. The four giant kilns 375 ft. long were the most spectacular units in the large mass production equipment installed in the plant. Ice cold Coca-Cola was served after the visit was completed, courtesy of the Lone Star Cement Co.

A film on Material Handling was shown through the courtesy of J. W. Sheppard at our meeting of April 13. This film covered electric trucks operated from Edison Storage Batteries loading and unloading material with ease and the time saved. This picture was well received and at the conclusion Mr. Sheppard was given a rising vote of thanks.

We expect to start a course in Automatic Controls covering heating, cooling and refrigeration at our next meeting which will be helpful in our securing new members.

New Uses for Heat Meter

A NUMBER of new applications for the heat meter have been reported by J. T. Gier and R. V. Dunkle, the two University of California scientists who developed it. It is a wartime invention which was used secretly in aircraft development to measure the heat lost through the skins of airplanes at high altitudes. Also it was used in the development of flying suits by measuring the loss of heat from aviators' bodies through different types of materials and designs.

The heat meter was described in October ICE AND REFRIGERATION in an article beginning on page 23. It is a portable instrument which can be conveniently used to measure the heat flow through installed insulation of walls of any refrigerated enclosure. By use of the meter any change in the insulating value of the walls can be determined and trends toward deterioration can be discovered and corrected.

New Uses

At present the inventors are using the heat meter at the Agricultural Branch of the University of California to check heat loss from pigs and the resultant effect on appetites. For the Navy, they are checking heat absorption rates of various types of paints to be used in planes at high altitudes.

One of its most useful applications may be to replace the tedious process for measuring human metabolism now used by most physicians. It may be possible for a doctor to measure an individual's rate of energy conversion merely by applying the meter to the surface of the body. It also will be possible to measure metabolism of a person while he is taking vigorous exercise, which is impossible with the present "quiet" metabolism technique.

In industry, the meter can be applied to walls, parts of engines, and refrigerators to check heat loss.

Heat Pump Research Committee

A TEN-MAN Technical Advisory Committee on the heat pump has been formed by the American Society of Heating and Ventilating Engineers, L. N. Hunter, chairman of the committee on research, announced recently. The group, headed by Dr. R. C. Jordan, of the Mechanical Engineering Department of the University of Minnesota, will evaluate and determine satisfactory heat sources for heat pump applications in temperate zones.

The heat pump, still in the experimental stage, is a new development for utilizing the natural heat of the earth. It would be used to regulate temperatures in all types of living units by pumping heat out of the earth in the winter and pumping house heat back into the earth in the summer.

Other members of the group, which is one of 16 technical advisory committees composed of over 200 engineers and scientists in the ASHVE, are: E. R. Ambrose, Air Conditioning Engineer, American Gas and Electric Service Corp., New York, N. Y.; R, D. Blum, Application Engineer, York Corp., York, Pa.; C. F. Boester, Housing Consultant, Purdue Research Foundation, Purdue University, Lafayette, Ind.; C. W. Brown, Application Engineering Division, General Electric Co.; Bloomfield, N. J.; W. F. Friend, Mechanical Engineer, Ebasco Services, Inc., New York, N. Y.; M. C. Giannini, Executive Assistant and Associate Professor of Mechanical Engineering, New York University, New York, N. Y.; J. D. Kroeker, Consulting Engineer, Portland, Ore.; E. P. Palmetier, Project Engineer, Carrier Corp., Syracuse, N. Y.; and S. S. Sanford, Heating, Ventilating, and Air Conditioning Engineer, Detroit Edison Co., Detroit, Mich.

Standards Show Safe Use of Methyl Chloride

By H. H. Schrenk
Scientist Director, Division of Industrial Hygiene
U. S. Public Health Service

THE new American Standard Allowable Concentration for methyl chloride has been approved by The American Standards Association. This standard sets the maximum allowable concentration of methyl chloride gas in the air of work places as 100 parts per one million parts of air. This series of standards is being developed under the procedure of the American Standards Association by a committee of scientists and medical men.

Laboratory investigations and practical experience have shown that the human body can detoxify, destroy, eliminate, or otherwise handle a certain amount of any material without measurable damage. This fact is the foundation on which procedures for the control of atmospheric contaminants are based. However, it is necessary to determine the concentrations of materials that can be handled by the human body in order to know the extent to which control procedures should be instituted.

This has led to the development of maximum allowable concentrations of contaminants, which have essentially the the same significance to the industrial hygienist as strength of materials has to a construction engineer. When equipment or procedures for the safe handling of chemicals are designed, information on the physiological properties is of equal importance to the chemical and physical properties if adequate safe-guards to prevent injury are to be provided.

The maximum allowable concentration is the concentration that can be tolerated without injury throughout the working day over an indefinite period of time. The data on which such concentrations are based are obtained from many sources, and the ASA Sectional Committee on Allowable Concentrations of Toxic Dusts and Gases, Z37, serves as a clearing house where such information can be assembled and reviewed and a decision made regarding an acceptable, allowable limit. Such limits are not static but are subject to revision whenever additional information warrants reconsideration.

Methyl chloride is used as a refrigerant, as a catalyst solvent in the synthetic rubber industry, as an extractant for greases, oils, and resins, as a dewaxing agent in the petroleum-refining industry, and as an agent for methylation, chlorination, and other reactions, utilized in the preparation of various organic chemicals. Its widespread industrial applications and knowledge of its toxicity emphasize the need for establishing a maximum allowable concentration for this compound.

The main hazard associated with the handling of methyl chloride is from absorption by inhalation. While acute poisoning may result from a single exposure to high concentrations, chronic poisoning from repeated exposures to lower concentrations is more significant. Symptoms that may be encountered are increasing fatigue, loss of appetite, drowsiness, muscular weakness, staggering gait, mental confusion, vertigo, visual disturbances, nausea, slurred speech, convulsions, and coma.

Values suggested for the maximum allowable concentration of methyl chloride have ranged from 100 to 500 parts per million. After careful consideration of available toxicological data and experience in handling methyl chloride in industry, it was decided that: "The maximum allowable concentration of methyl chloride shall be 100 parts per 1,000,000 parts of air by volume corresponding to 0.2 milligram per liter at 25 C and 760 mm pressure, for prolonged exposures not exceeding a total of eight hours daily."

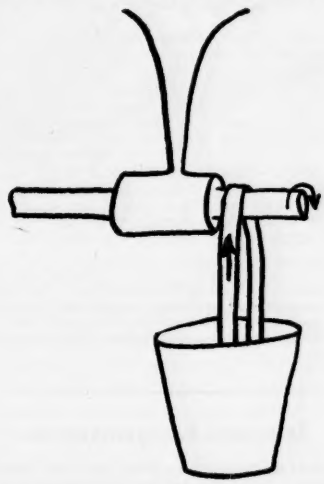
Past experience in handling methyl chloride in industry indicates that this standard is a practical one and can be met with engineering procedures that are now available.

Application of Standard

Methyl chloride or monochloromethane is a gas at ordinary temperature and pressure and therefore is readily disseminated into the air. It has no distinctive warning properties when present in air in dangerous concentrations; therefore one may be unaware that injurious amounts are being absorbed. To prevent injurious exposures, it is necessary to determine the concentration of methyl chloride in the breathing zone of exposed persons. Methods are available for the collection and analysis of individual samples and for continuously recording the concentration. The results of the determination of the concentration of methyl chloride in air interpreted in terms of the maximum allowable concentration can be used to evaluate the hazard. By following this procedure and applying control measures where excessive concentrations are found, injurious exposures may be avoided.

How to Cool a Bearing with Water

MANY years ago my good and exceptionally capable friend, the late O. N. Trooien and I were troubled with a hot bearing which could not be cooled by mere oiling. To keep it cool we poured cold water on it and thus kept things going in the plant until shutting down time.



The sketch herewith, though, shows a better method which did not occur to Trooien or to me at the time. Where conditions allow this is an excellent method. An endless belt is placed on the shaft close to the hot bearing and is allowed to hang down into the pail of cold water as shown. As the shaft rotates it causes the saturated belt to move upward onto the shaft thereby keeping the shaft wet and cool and enabling it to absorb heat from the bearing. Any flexible belt that absorbs water readily will serve the purpose. The belt should be kept as close to the hot bearing as possible. With this method there is no splashing of water and there is no mixing of the water with the lubricant.

COMING CONVENTIONS

NATIONAL FROZEN FOOD LOCKER ASSOCIATION
August 28-31, 1949
Stevens Hotel, Chicago, Ill.
S. A. WARRINGTON, *Secretary*

DELTA STATES ICE ASSOCIATION
November 28-30, 1949
Buena Vista Hotel, Biloxi, Miss.
R. N. MILLING, *Secretary*

Fires and Accidents

Rocky Ford, Colo.—The Polar Ice & Locker Co. storage building was damaged by fire causing loss estimated at $3,000 to $4,000. The building was used in connection with the Rocky Ford Products Co.

Concordia, Kans.—The Concordia Ice Co. recently had a fire. Smoke issued from the double walls of the cooling room and the firemen had to tear up a part of the floor to get at the blaze. It was not known what caused the blaze.

Boyne City, Mich.—Fire, believed to have been caused by an overheated flue, recently destroyed the receiving room and processing equipment of the Curtiss dairy plant on State St. Complete replacement of the damaged structure was estimated at $5,000.

Escanaba, Mich.—Fire of undetermined origin partially destroyed the Ray Cartwright smokehouse and meat plant at Soo Hill. The equipment was housed in a wooden structure and all electric motors and meat grinders were destroyed. The refrigeration units were not damaged.

St. Paul, Minn.—An ammonia explosion March 24 caused an estimated $40,000 damage when it blew apart the compressor building of the Certified Ice and Fuel Co. here. Firemen said no fire resulted from the explosion in the building at 282 W. Water St. The roof was blown off. Also, the rear of the 30 by 40 ft. concrete block structure was blown off and parts of two walls were wrecked.

Omaha, Nebr.—The Omaha Ice & Cold Storage Co. lost a one-story frame garage housing four trucks, 28 refrigerators and other equipment in a recent fire which did $260,000 damage to the cold storage plant and an adjoining electronics plant.

Sylva, N. C.—Fire destroyed the Sylva Ice Co. plant building and an adjoining dwelling about two miles east of here. Damage was estimated at $20,000. Two 54-gallon barrels of fuel oil in the building exploded and made the task of fighting the fire more difficult. Two ammonia tanks also exploded.

Sales and Reorganizations

Newton, Ala.—The local ice plant has been purchased by the Enterprise Ice Co. and located on the former Killebrew Mill site. Lockers and ice-making facilities are to be modernized, it is announced.

Dewey, Okla.—Purchase of the Glencliff creamery and ice plant by the Crystal Ice and Frozen Food Lockers, Inc., of Bartlesville, was recently announced by Edward C. McClintock, president of the Crystal Co.

Gettysburg, Pa.—The C. H. Musselman Co. of Biglerville has purchased the Adams County Cold Storage Co. here and the Keller farm of about 200 acres which adjoins the Blue Ribbon Orchard now owned by the Musselman Co. between Gettysburg and Arendtsville. The purchase price was not disclosed, but it was stated that the amount would be in excess of $100,000.

ASSOCIATION DIRECTORY

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433 N. Waller, Chicago 44, Ill.

NATIONAL ASSOCIATION OF ICE INDUSTRIES
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NATIONAL ASSOCIATION OF REFRIGERATED WAREHOUSES
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NATIONAL ASSOCIATION OF PRACTICAL REFRIGERATING ENGINEERS
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FLORIDA ICE ASSOCIATION
Muriel Washburn, Secretary, 1931 Silver St., Jacksonville, Fla.

ILLINOIS ASSOCIATION OF ICE INDUSTRIES
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INDIANA ASSOCIATION OF ICE INDUSTRIES
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MICHIGAN ICE INDUSTRIES ASSOCIATION
Wm. J. Campbell, Secretary, Pleasant St. at Campbell, Belding, Mich.

MISSOURI ICE MANUFACTURERS' ASSOCIATION
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NEBRASKA ASSOCIATION OF ICE INDUSTRIES
Frank Vogelsang, Secretary, W. T. Good Ice Co., Lincoln, Nebr.

NEW ENGLAND ICE ASSOCIATION
Raymond Wilber, Secretary, 419 Boyleston St., Boston, Mass.

NEW YORK STATE ASSOCIATION OF REFRIGERATED WAREHOUSES
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E. Dana Smith, Secy., Diamond Ice & Coal Co., Charleston, W. Va.

WISCONSIN ASSOCIATION OF ICE INDUSTRIES
Paul F. Hoff, Secretary, 1300 East Locust St., Milwaukee, Wis.

New Incorporations

Lincoln, Nebr.—City Products Corp. has filed articles of incorporation with the Nebraska secretary of state to operate a cold storage business. Incorporators are C. G. Dedrick, K. R. Gregory and J. R. Broadway, all of Chicago, Ill.

Galveston, Tex.—A 50-year charter of incorporation was granted Liberty Ice and Cold Storage Co. recently. Incorporators are Demas A. Caravagoli, John A. Mehos and Harris J. Booras. Authorized capital stock was listed at $5,000.

Gillette, Wyo.—Silver Crest Service, Inc. has taken out a Wyoming charter to operate a cold storage warehousing business here. The new firm is capitalized at $50,000 and directors are O. C. Wilhelm, John W. Reed and Mary J. Reed, all of this town.

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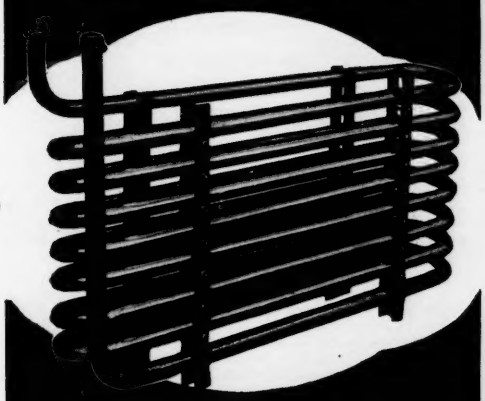

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NEW PLANTS AND IMPROVEMENTS

Information pertaining to proposed new plants utilizing refrigerating equipment, as well as additions, improvements, and rehabilitation of existing plants. News regarding such new plants and additions is invited for publication in this department.

CALIFORNIA

Calexico, Calif.—It is estimated that $300,000 will be spent in new construction and equipment to enable the Gulf Sea Food Co. of Third St., to provide facilities for storage of 5 to 8 million pounds of shrimp and fish. The company has purchased two lots back of the present site from the city to provide for expansion. When the new plant is in full production, it is planned to give employment to at least 100 persons.

Delano, Calif.—A new ice manufacturing plant is being erected here for the Central California Ice Co., at a cost of $100,000. The structure, being erected by L. H. Hansen & Sons of Fresno, will replace one recently destroyed by fire.

Ontario, Calif.—General Foods Corp. is constructing a vegetable quick-freeze plant here, W. W. Stevens, head of the Ontario Ice and Cold Storage Co. which has been handling the corporation's freeze operations here for three years, disclosed recently. The plant, a fabricated steel structure, will occupy a 90-foot frontage on Sultana Ave. adjacent to the Southern Pacific Railroad.

Sanger, Calif.—An $80,000 addition to the present plant of the Sanger Ice and Cold Storage Co. is being erected here, increasing freezing capacity 20 tons, making a total capacity of 70 tons a day. The new building will include a subzero storage room providing space for more than 4,000 pounds of frozen food and 32 F. storage of 30 cars of grapes and other fruit. It will be 70 by 150 ft.

CANADA

Dundas, Ont., Canada—A municipal ice plant that will turn out between 12 and 15 tons a day during the summer months is one of the features being considered for the new town arena here. Dundas is faced with a shortage of ice during the summer and an ice plant would provide a much needed service.

COLORADO

Colorado Springs, Colo.—Union Ice Co. has installed two Polar automatic ice vending stations equipped with two vendors for cake and cubed ice in each station.

Denver, Colo.—The Colorado Ice & Cold Storage Co. has installed two Polar aluminum refrigerated ice stations equipped with three vendors for cake and cubed ice in each station.

FLORIDA

Miami, Fla.—A million dollar canning and freezing plant will go into operation this spring in Uleta, 12 miles north of Miami. The plant will have an estimated output of thirty million pounds of frozen foods and twelve million cans of fruits and vegetables.

GEORGIA

Homerville, Ga.—O. E. Tally, local ice and refrigeration dealer, began construction recently on his new ice depot to be situated on the Fargo highway south of the ACL railway. The building will be of concrete structure, with adequate room for public loading, ice storage, and concessions of a general nature.

Macon, Ga.—Kinnett-Odom Ice Co. has installed a Polar aluminum refrigerated ice station.

INDIANA

La Porte, Ind.—City Ice and Beverage has a new 16 ft. Polar Ice Vendor for merchandising bagged ice.

IOWA

Council Bluffs, Iowa—Safeway Stores Inc., has purchased from the Union Pacific railroad 54 acres as a distribution center site to include refrigerated warehousing facilities to speed distribution and processing operations for the 83 stores served by the division.

MASSACHUSETTS

Buzzards Bay, Mass.—Buzzards Bay Ice Co., has installed a Polar Ice Vendor.

MINNESOTA

Minneapolis, Minn.—Cedar Sanitary Ice Co. has installed a Polar Automatic Ice Vending Station equipped with three Polar vendors for vending 25 and 50 lb. ice cakes and bagged ice.

MISSISSIPPI

Gulfport, Miss.—Work is almost completed on the Bay Ice Co. plant. Harry L. Sumrall of Bay St. Louis, owner, advised the $25,000 structure will be fireproof and will have a 60-ton capacity.

Tupelo, Miss.—Mid South Packers, Inc., is planning a $250,000 addition to its meat packing plant. The one-story addition, containing 26,300 sq. ft., will house offices, a smoke room, freezer and pre-cooler rooms.

MISSOURI

Memphis, Mo.—Memphis Ice Co. has installed a Polar Aluminum Ice Station.

NEW MEXICO

Tucumcari, N. Mex.—The Tucumcari Ice Co. is installing four 1410 Polar stations with vendors. This company has also purchased Polar display cabinets for merchandising bagged ice.

NEW YORK

Buffalo, N. Y.—The Brownrout Seafood Co., 451 Elmwood Ave., has completed a $100,000 addition to its facilities, providing 18,000 to 19,000 cubic feet more of refrigeration, and has formed a frozen food division, it was announced by Louis N. Brownrout, a partner in the firm.

TEXAS

Cayuga, Tex.—A Polar ice station has been installed at the Home Ice Co. here.

Corpus Christi, Tex.—The Central Power & Light Co. has purchased manually operated Polar stations for a number of their locations in Texas. These aluminum Polar stations will be installed here and at Driscoll, North Pole, Agua Dulce, Victoria, Edroy, Edcouch and Mission. This company has also purchased Polar coin merchanisms for conversion installations on some of their present equipment.

Grapeland, Tex.—Forston Bros. are installing a Polar ice vending station.

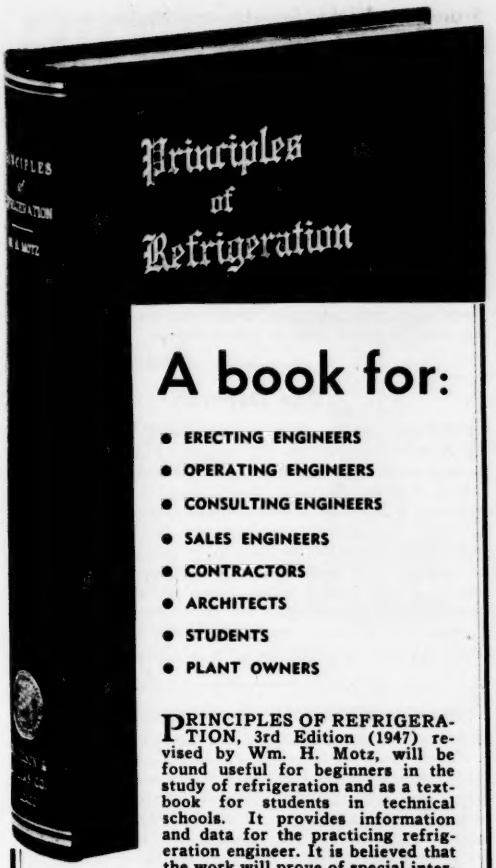
Mexia, Tex.—A Polar ice vendor was recently placed in service at the Phillips Ice & Coal Co. plant.

Plainview, Tex.—The Clary Ice Co. has installed a new Polar ice vending station equipped with three Polar vendors.

Richmond, Tex.—The Horlock Ice Co. has installed Polar vendors for vending 25 and 50 lb. cake ice.

WYOMING

Cheyenne, Wyo.—Crystal Ice Co. has installed three Polar automatic refrigerated ice stations with three vendors in each station for vending cubed and cake ice.



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PRINCIPLES OF REFRIGERATION, 3rd Edition (1947) revised by Wm. H. Motz, will be found useful for beginners in the study of refrigeration and as a textbook for students in technical schools. It provides information and data for the practicing refrigeration engineer. It is believed that the work will prove of special interest to erecting and operating refrigerating engineers, refrigeration machinery sales engineers, persons employed in building refrigerating machinery and those employed in ice making, cold storage plants or other establishments equipped with refrigerating machinery. In general the work contains information that is necessary the refrigerating engineer should know in order that he may have complete and up-to-date knowledge of the theory and practice in this field of endeavor.

The work is in every day language and as free as possible from higher mathematics. The method of treatment has been to present a comprehensive treatise on the fundamental principles. With a firm grounding of these fundamental principles the practitioner is enabled to intelligently design or operate refrigerating machinery. The theoretical and fundamental operating principles are given attention first. This is followed by numerous practical considerations and the application of the fundamental principles to the economic production of ice and refrigeration for various purposes.

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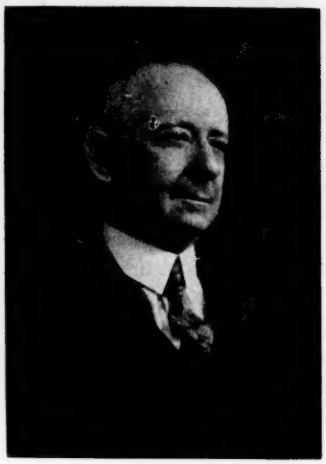
OBITUARY

Colonel Robert Lee Beare

THE death of Robert Lee Beare, chairman of the board of the Beare Ice & Coal Co., Jackson, Tenn., and one of Jackson's leading business executives, occurred Saturday morning, March 5 at the age of 84. Death, attributed to a heart attack, came after two months of failing health during which he was absent from his office but was not thought critically ill.



R. L. Beare, Jackson, Tenn.

In addition to his ice company interests, Col. Beare was chairman of the Five Points Lumber Co., vice-president of the Second National Bank and Jackson Transportation and director of the Sun Publishing Co., Jackson Packing Co., and Cawthon Motor Co., and member of the Lambuth College Board of Trustees. He established the Beare Ice & Coal Co., then known as Beare Bros. in 1906 and was its president from that time until 1945.

Col. Beare was born in Aberdeen, Miss. As a young man he was employed at Ft. Morgan, Ala., as a telegraph operator and later at Aberdeen as manager of Western Union. In 1896 he moved to Humboldt and with his brothers, Samuel Taylor and Will H. Beare, now deceased, entered the ice manufacturing and coal business under the name of Beare Bros. Ice & Coal Co. In 1906 he sold the Humboldt business and moved to Jackson where he established the Beare Ice & Coal Co.

He was a member of the First Methodist Church and had been a member of its board of stewards for many years. He was a member of the Elks Lodge, the Rotary Club and former president of the Jackson Golf and Country Club. Through the years he took an active interest in civic and charitable enterprises in Jackson.

He is survived by his widow and his son, R. L. Beare, Jr., of Jackson, and a daughter, Mrs. Allen Cox, Jr. of Memphis.

JOHN SCHERF, former owner of the Scherf Ice & Coal Co., Springfield, Ill., died recently at St. John's Hospital. Surviving is one daughter, Mrs. Edward Farrell of Sheboygan, Wis.

Frank Stanley Hadfield

THE death of Frank Stanley Hadfield, prominent in the ice and refrigeration industry of Southern California for more than a quarter of a century, occurred March 14 as the result of a heart attack. He was 67 years old.

Mr. Hadfield was born at Mineral Point, Wis., in 1881 and graduated from the University of Illinois, Class of 1904 with Bachelor of Science and Mechanical Engineering degrees. Coming to California in 1920, he became associated with and later general manager of the Gay Engineering Corp. of Los Angeles until 1938. In 1938 he organized and served as president of the Associated Refrigerating Engineers, Los Angeles, retiring from active business duties in 1945. He was also a past-president of the Refrigeration Contractors Association of Los Angeles. Surviving are his widow, one son, two daughters and six grandchildren.

Dan Donovan

THE death of Dan Donovan, partner in the Pontiac Ice & Fuel Co., Pontiac, Ill., occurred February 27, 1949. He had been in failing health about a year. Mr. Donovan with L. A. Fretz purchased the Pontiac Ice Co. and started operating it January 1, 1920. This business consisted of a natural ice house and delivery trucks. In 1921, a local coal yard was purchased to be operated in conjunction with the ice business and in 1927 a 25 ton ice plant was built. In 1938-39, three locker plants were added, one each at Pontiac, Odell and Dwight, Ill. In addition to the above business, Mr. Donovan was a co-partner in the Williams Dairy and the Corn Belt Sales Co. of Pontiac.

PIERCE R. MCCRARY, Lakeland, Fla., inventor who invented one of the first ice and refrigerator machines, died at Morrell Hospital, Lakeland, January 27. He was 83 years old. A member of the Society of American Military Engineers, Mr. McCrary won gold medal and blue ribbon awards for refrigerating machines at the Jamestown World Exposition in 1907. He was employed by the Federal Government in World War I, and installed an air cooling device in the White House. He was once engaged in the ice machinery business in New York City, but sold his interests there and moved to Florida where he entered the real estate business.

W. K. MCINTOSH, who recently retired as chairman of Liquid Carbonic Corp., died last month at his home in Chicago at the age of 71. Mr. McIntosh started with Liquid Carbonic as a stenographer in 1902 and after filling various offices in the organization was elected president in 1923. In 1929, he became chairman of the board, in which capacity he continued active in the management of the company until his retirement last January.

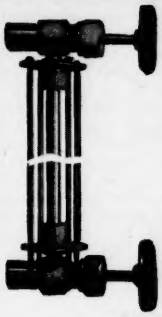
GEORGE A. HEMAN, engineer for the Grocers Ice & Cold Storage Co., Louisville, Ky., for many years, died March 14 at Mary and Elizabeth Hospital, Louisville. He was 86 years old.

Icy Item

Houston, Tex.—By amendment to its charter, approved recently by the Secretary of State, the J. A. Darby Ice Co. was permitted to increase its capital stock to $30,000.

San Antonio, Tex.—Dixie Ice Co. amended its charter recently, increasing its capital stock to $40,000.

SHANK REFRIGERATION PRODUCTS



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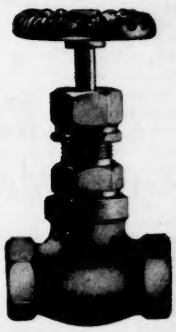

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Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem—Shank design base—perfect alignment. Long life packing ring.

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In addition to helping save food, top-icing with snow-ice cuts car icing cost 42% (from a time study) and has further advantages such as:

—the blast of ice and cold air forces all warm air from car.

—only a few minutes required to top-ice a car.

—snow-ice melts gradually and uniformly (chunk ice leaves holes between cakes). Products arrive as fresh and crisp as when loaded.

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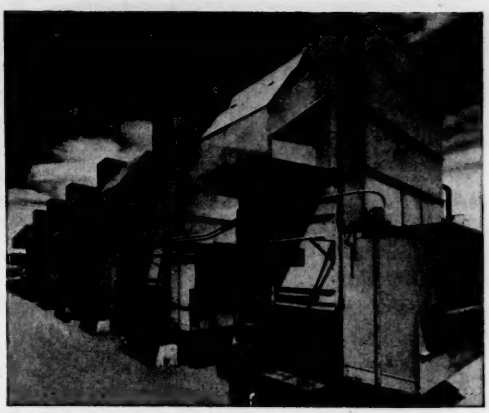

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In this new method the refrigerant gas passes through two cooling coils. The first coil, air-cooled, removes the superheat and condenses oil vapor from the refrigerant; the second condenses the refrigerant by the evaporation of a water spray from its surface. The heat is transferred to the air; less than 10% of the water used in conventional condensers is consumed and you save the cost of the water and the cost of its piping, pumping and disposal.

In addition the Niagara Aeropass Condenser controls the head pressure of your compressors at the lowest point for good operation, reducing your power bills. It does this automatically the year 'round, giving full capacity for peak summer loads and providing the greatest power saving in cold weather.

Hundreds of experiences in all industries that use refrigeration demonstrate these benefits and prove that they give a lasting improvement in refrigeration plant operation.

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MACHINERY-APPLIANCES-PROCESSES

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

Reco Introduces New Ice Can Filler

THE Reco Products Division of Refrigeration Engineering Corp. recently completed development work, and has placed on the market, a new can filler. The Filler is unique in that it is a Universal Type, automatic in operation and suitable for use in any size can on lines having pressures varying from 5 to 55 lbs. p.s.i.

New RECO Ice Can Filler

The filler is light in weight, speedy in operation and durable in construction. It is equipped with an adjustable can hanger constructed of heavy sheet steel, galvanized after fabrication. Adjustment of the hanger is simple and is accomplished in a matter of minutes to give a wide range of water levels. When set for desired water level no further adjustment is required. Nozzle and body of filler are constructed of heavy casting with Iridite metal finish. Operation is completely automatic. A patented mechanism, which shuts the water inlet when the desired water level has been reached, operates automatically, releasing the trigger handle and closing the inlet valve.

The Reco Universal Type Can Fillers are covered by a factory warranty covering defective parts and workmanship for a period of one year from date of shipment, and in addition the company offers a fixed price replacement exchange service. No spare parts are required to be on hand and the replacement service can be made promptly. The new filler is well suited for daily use in small ice plants and for intermittent and standby use in large plants.

Chrome Lock New Gasketing Material

A SPECIALLY compounded and impregnated felt called "Chrome Lock" containing zinc chromate as a corrosion inhibitor has been introduced by The Products Research Co., Glendale, Calif. It is used for protective gasketing or sealing between all types of faying surfaces such as flanges and lapped or butted joints. Under bolted, screwed or nailed pressure the resins traverse within the felt and are also extruded onto the faying surfaces in sufficient quantities to form a positive dam.

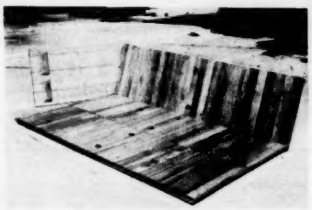
Showing Application of Chrome Lock

The resultant seal, it is claimed, provides both the exclusion or retention of air, water, dust and many other materials. It has been used very successfully by the Navy and Maritime Industry for ventilation and deck drainage sealing, and of late has attracted considerable attention from a number of other industries including air conditioning and refrigeration as both an original manufacture and replacement gasketing.

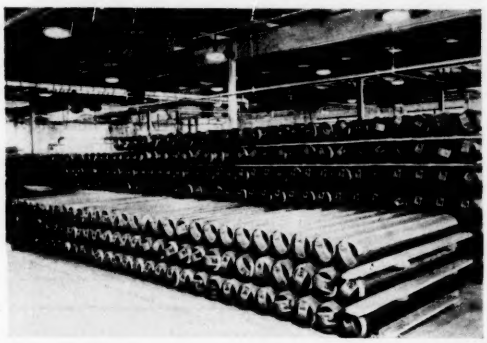
It is available in four thicknesses: 1/32, 1/16 and ¼ in. in any width from 3/16 to 72 in. in lengths 100 ft. 1/32 and 1/16 in. thicknesses; 50 ft., ⅛ in. thickness; 25 ft.—¼ in. thickness. It is also available as a stamped gasketing to fit individual requirements. Write Products Research Co., 5426 San Fernando Rd., Glendale, Calif., for Engineering folder C-1011 and free sample.

Ice Can Covers Get Face-Lifting

THE Santa Fe Tank & Tower Co. of Los Angeles added new beauty and serviceability to a recent design for ice can covers. Using a special finish of spar varnish or boiled linseed oil, Santa Fe has produced an attractive covering for heavy loads. These covers will retain their strength and appearance through many years of hard usage. Specifications call for an Oak top layer and a Fir bottom layer, both separated by two layers of 15 lb. felt. Top and bottom layers are nailed together diagonally. Oak "drag cleats" are tapered on all four sides. Extra-long lifting pins add to the serviceability of these covers.



New Ice Can Cover



Ammonia in 150-lb. cylinders is ready for the summer rush at the Atlanta, Ga., filling plant of Mathieson Chemical Corp. The plant has an ammonia cylinder storage capacity of 112 tons, or 1500 cylinders, plus 75 tons, or 1000 cylinders, of chlorine.

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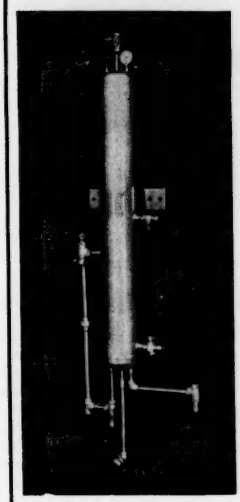
HOLD HEAD PRESSURES DOWN



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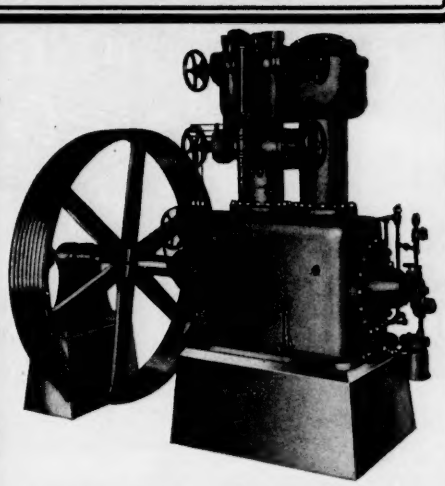

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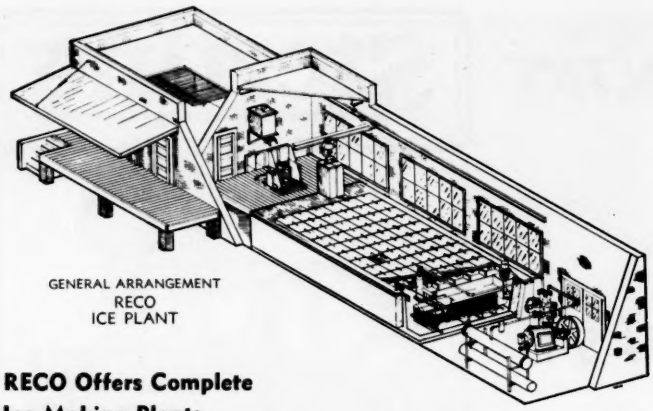


GENERAL ARRANGEMENT
RECO
ICE PLANT

RECO Offers Complete Ice-Making Plants

TO SUPPLY the demand for ice-making equipment, Reco Products Division of the Refrigeration Engineering Corp., has introduced a complete line of pre-engineered standard ice plants in a range of sizes from 5 to 80 ton daily capacity. These plants are shipped complete with all component parts selected and arranged for simple installation. Diesel, electric or gasoline driven models are offered.

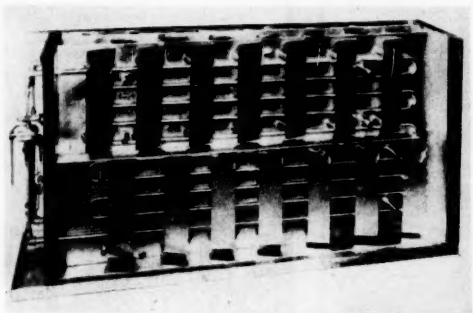
The demand for this equipment was such that a new line of packaged plants in 5, 10, 15, 20 and 25 tons capacity have been made available especially for the foreign trade.

Complete plants are carefully boxed with all components fully marked. Assembled drawings are provided with components labeled to correspond with similar markings on the drawings.

Water and Brine Cooler

A NEW series of cabinet type ice builders has been announced by the King Zeero Co., 1447 Montrose Ave., Chicago 13. Designed for use with Freon, methyl chloride or ammonia, the sizes range from 2,000 to 11,250 lbs. of ice capacity.

The construction features are steel coils welded to the ice plate and each coil is equipped with an individual expansion valve. Stationary louvres in the water stream direct the flow for rapid buildup of ice or regain of refrigeration through ice melting. Two inches of corkboard insulation is prvided in the cabinet sides and bottom and covered with polished sheet aluminum.



Cut away view of ice builder showing coil construction and fixed louvres which direct flow of water for rapid chilling.

Iced Vegetable Demonstrator

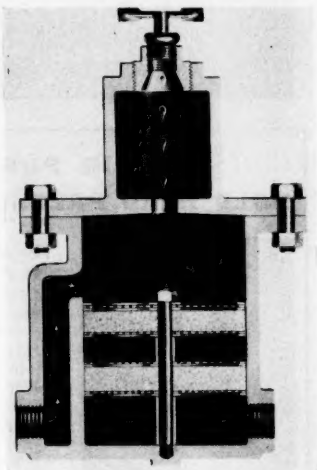
AT THE request of the ice industry a 3 ft. iced vegetable display counter has been developed for demonstrator purposes by Trusty Manufacturers, Inc., manufacturers of iced vegetable counters at LaPorte, Ind. This new case which can be installed without removing shelving and other displays is ideal for demonstrations in food stores and furnishes a real sales demonstrator.

Trusty Vegetable Display Demonstrator

It also may be used for permanent installation in small stores and for spot displays in larger markets. These demonstrator cases have the same construction details as are available in the 6 and 8 ft. models of the Trusty display counter line. A 6 in. plexiglas may be installed around the front for greater capacity.

Compressed Air Separator For "Spot" Installation

A NEW compressed air separator has been designed by James A. Murphy & Co., Hamilton, Ohio. Designated "Murphy Paragon 'C' ", the separator is designed to remove oil, moisture and dirt from compressed air at the point of use in conjunction with such operations as fine painting, mirror silvering, blowing dust from highly polished surfaces or from surfaces subject to corrosion, "blowing out" of precision units during assembly, etc.

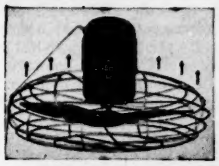


New Compressed Air Separator

Installed in the pipe line just ahead of the point of delivery, air enters the unit at the top right and is conducted to the expansion chamber below the strainer cartridge, where expansion and surface contact separates air and moisture. The air then rises slowly through two cotton felt absorbant pads, tightly packed between perforated brass baffles which are supported in the filter cartridge by grids and spacers. The cotton felt pads trap oil, grit and moisture.

The unit is offered in two sizes. 5¼x8½ in. and 6½x8½ in. overall.

Reco REFRIGERATOR FANS... ...keep COOLERS DRY!



FANS THAT BLOW UPWARD!

THE NEW Reco SYSTEM OF AIR CIRCULATION

Prevents Cross Transference of Flavors In Stored Products.
Dissipates Odors.
Keeps Walls and Ceilings Dry.
Reduces Refrigeration Costs.

FREE MANUAL
Write for Bulletin 241 giving valuable suggestions about upkeep of refrigerated spaces.

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Mfrs. of Refrigerator Fans, Fly Chaser Fans and Meat Choppers
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Dependable Rotary Positive Blowers

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REX AMMONIA HOSE
for Refrigerated Trucks

Rubber covered high tensile flexible steel hose, with steel S.P.T. male couplings each end. Guaranteed to give satisfaction.

¼"x6' each $5.00. ½"x6' each $7.00.

Write for prices on other lengths and descriptive material.

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Oklahoma City, Oklahoma
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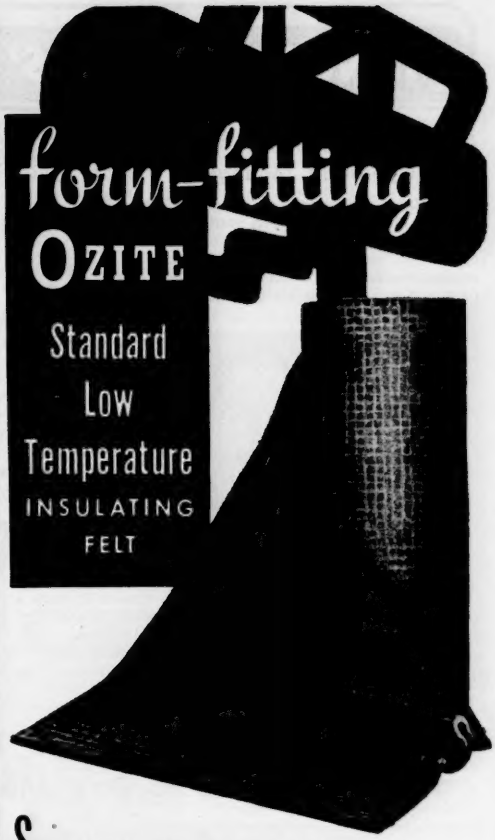


STOPS HEAT PENETRATION

No bend is too intricate, no elbow too large, no form too complex for flexible, form-fitting *Ozite* Insulating Felt. Easily applied to all pipes, ducts, and other exposed areas, it can be cut to fit any shape snugly and meshes at joints to form a permanent heat seal.

Ozite Insulating Felt gives highest resistance to heat penetration, retains its efficiency and permanency in the presence of moisture and other adverse conditions and requires no servicing.

WRITE FOR COMPLETE INFORMATION

AMERICAN HAIR & FELT COMPANY
Dept. L95 Merchandise Mart, Chicago 54, Illinois

MANUFACTURERS' NEWS

Mathieson Announces New Operating Managers

SEVERAL changes in operating management have been made by Mathieson Chemical Corp. due to increase in the number of plants resulting from recent acquisitions. The directors have appointed Dr. Carl F. Prutton vice president-director of operations of all the company's plants and Arthur T. Bennett, vice president, was placed in charge of the eight plants acquired from Southern Acid & Sulphur Co. R. B. Worthy and J. F. Newell were named vice presidents.

Carl F. Prutton Arthur T. Bennett

Dr. Prutton, who joined Mathieson last year as director of research, will have charge of research and supervise operations of all the company's plants including those recently acquired. His headquarters will be in the Mathieson New York offices. Mr. Bennett will have his headquarters in Houston. Mr. Worthy will be in charge of the plants acquired from Standard Wholesale Phosphate and Acid Works as well as the Saltville, Va., plant, of which he has been manager. Mr. Newell remains at Lake Charles, La., where he has been in charge of the alkali and ammonia plants.

Before joining Mathieson in 1948, Dr. Prutton was head of the Department of Chemistry and Chemical Engineering at Case School of Applied Science, a consultant to a number of chemical companies and, from 1942 and 1944, Chief of the Process Development Branch of the Office of Rubber Director and consultant to the War Production Board. He is the author of many scientific papers in the fields of chemistry and chemical engineering, holds many patents, and is a member of numerous scientific organizations.

Baker Elects Pendergast President

THE election of T. S. Pendergast as a Director and President of Baker Refrigeration Corp. has been announced. Mr. Pendergast has held the position of general manager at Baker for the past six months. In commenting on his appointment,

Thomas S. Pendergast

Albert Fink Milton, secretary-treasurer and Chairman of the Executive Committee said that the Board's decision to place an "on the scene" President became advisable due to the increased activities and sales efforts of the Corporation. During the past few months, Baker has announced several new air conditioning and refrigeration products for their distributors, both domestic and foreign. Mr. Pendergast will continue in charge of Baker's manufacturing activities and sales efforts.

Martocello Names New Representative

A NEW Pacific coast representative, the Western Ice Equipment Co., 420 Market St., San Francisco, Calif., has been appointed by Jos. A. Martocello & Co., manufacturers of ice-making systems and supplies.

This company will represent Martocello in California, Washington, Oregon and Nevada. Thos. B. Gilliam, who operates the Western Ice Equipment Co., is already well known throughout the ice industry with which he has been associated for the past 30 years. He is highly respected on the West Coast for both his engineering ability and his efficient way of handling business. By the appointment of this new West Coast representative, Martocello's continue to add to their growing force.

MARTOCELLO ICE PICKS

"Cost You Less To Buy The Best"

Immediate Delivery on Plain Handle Ice Picks

BLADES

of High Carbon Tool Steel, accurately tempered to give you maximum use.

HANDLES

of Sound, Clear Hard Wood with Protective Flexible Lacquer Coating.

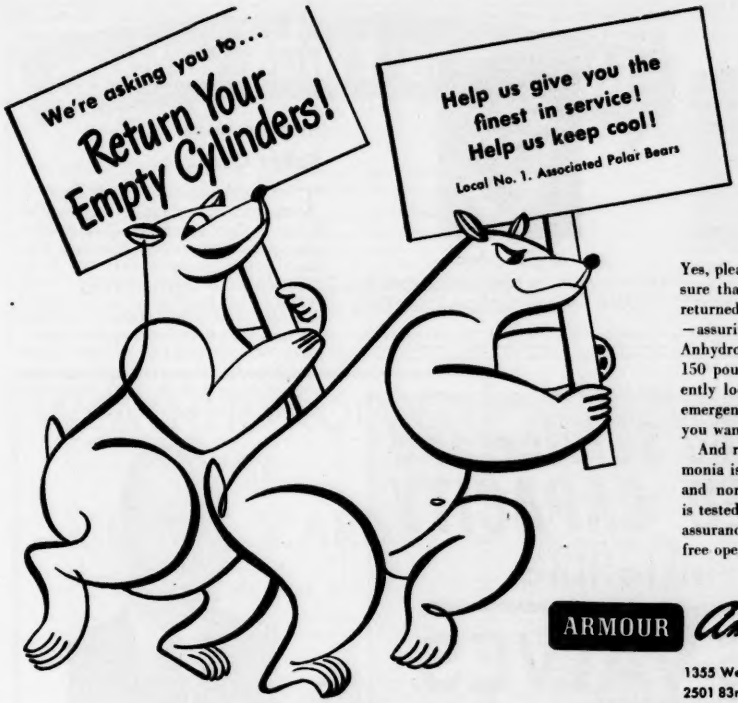
FERRULES

of Pressed Steel securely registered on Handle and Plated to Resist Corrosion.

PRICES ON PLAIN AND PRINTED HANDLES HAVE BEEN REDUCED! WRITE TODAY FOR NEW PRICES.

Jos. A. Martocello & Co. 229-231 NORTH 13th STREET PHILADELPHIA 7, PA.

"Serving the Ice Industry Since 1916" *There is no Substitute for* MARTOCELLO QUALITY"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Return Your Empty Cylinders!
Help us give you the finest in service! Help us keep cool!
Local No. 1. Associated Polar Bears

Yes, please look around your plant and make sure that every ammonia cylinder has been returned. Armour will continue to do its part —assuring you prompt shipment of Armour's Anhydrous Ammonia in either 50, 100 or 150 pound cylinders. Armour's 65 conveniently located stock points can deliver your emergency order where you want it, when you want it and fast.

And remember, Armour's Anhydrous Ammonia is pure and dry . . . free of moisture and non-condensable gases. Every cylinder is tested before shipping to give you positive assurance of fine quality and to insure trouble-free operations.

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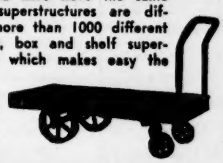
THIS THOMAS TRUCK MADE MANY WAYS

All 6 trucks pictured here have the same chassis. Only the superstructures are different. Thomas has more than 1000 different types of stake, rack, box and shelf superstructures cataloged, which makes easy the selection of a "job-suited" truck. Series 3400 truck at right. Hardwood frame, round corners. 10 platform sizes. Write for catalog.



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MODEL W-90-M
ADJUSTABLE GRATE—
For TRUCK MOUNTING

LITTLE GIANT
ICE BREAKERS
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10 MODELS TO CHOOSE FROM
Write for Descriptive Circular
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Air Pressure Tested COILS

Electrically welded, continuous; Air-Pressure-Tested while submerged in water. Built to your specifications. Send for new Coil Data Book and let us quote.

Welded Headers—Welded Ammonia Receivers
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61 BRIDGE STREET ETNA, PITTSBURGH 23, PA

Jones Appointed Link-Belt Export Manager

ANNOUNCEMENT is made by the Link Belt Co., that Roy E. Jones, heretofore assistant export manager, has been appointed export manager, with headquarters in New York City. He succeeds Carl A. Woerwag, who is retiring from active service because of ill health.

Mr. Jones, a mechanical engineering graduate of the University of Pennsylvania, started his Link-Belt career at the Philadelphia plant in 1927. After seven years of valuable experience in engineering, estimating and design work, and one year in

Roy E. Jones

general sales, he was transferred to domestic sales at the New York office in 1935. He has worked on export sales since 1941, and was made asst. export manager in 1944.

Trouble Free Service and INCREASED CAPACITY after installing J. H. H. VOSS VALVES

REG. U.S. PAT. OFF.

DESIGNED BY ENGINEERS
MADE BY CRAFTSMEN

in their COMPRESSORS

Replace those inefficient, troublesome valves and you too will get the utmost in economy, efficiency and safety of operation...you will get better results at lower power costs . . . you will get increased capacity . . . with VOSS VALVES.

This letter tells why

The WHITE BELT Dairy
Miami, Florida September 6, 1947

J. H. H. Voss Co., Inc.

In 1934 Voss Valves were installed in our 10 x 10 York ammonia compressor. This installation proved so satisfactory that we have installed Voss Valves in three other machines. To be specific in another 10 x 10, a 9 x 9 and a 7½ x 7½.

We wish to express our appreciation for the trouble free service and increased production that the installation of your valves have brought about.

As we add more machines to our refrigeration equipment they will be equipped with your valves.

WHITE BELT DAIRY,
John G. DuPuis, Jr., Manager

We will be glad to submit estimates if you will send us the name, bore, stroke and speed of your air, gas or ammonia compressors of any type or size.

J. H. H. VOSS CO., Inc. 785 East 144th Street NEW YORK 54, N. Y.

Martin Joins Baker Corp.

THE appointment of Walter T. Martin as Industrial Engineer at Baker Refrigeration Corporation (formerly Baker Ice Machine Co., Inc.) has been announced by T. S. Pendergast, general manager. This appointment is effective immediately and Mr. Martin has already assumed his new post at Baker's South Windham, Maine plant. He will have complete supervision of all time, motion analysis and methods engineering.

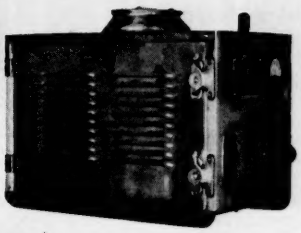
Walter T. Martin

In making this announcement, Mr. Pendergast stressed that the appointment was an addition to the Baker staff and one of a series to be announced shortly. The Baker Refrigeration Corp is strengthening its organization and planning new products to offer distributors who are located throughout the U. S. A. and foreign countries. Mr. Martin comes to Baker directly from Universal Cooler Division International Detroia Corp. of Marion, Ohio, where he spent the past three and one-half years in the time study department. Prior to this, he was with Kelsey Hayes Wheel Co., of Detroit for over four years.

Price Reduced On Corkboard

A 10 to 15 per cent reduction in the price of corkboard, effective on all orders received after February 25, has been announced by the Armstrong Cork Co., Lancaster, Pa. The range of the price reduction varies according to the shipping zones, the announcement said. All classes of trade and all types of the Company's corkboard insulation, Standard, Super-Service, Mastic-Finish Corkboard and Corkboard Roof Insulation, are affected by the reduction.

control odors and mold



USE GENERAL OZONE EQUIPMENT wherever eggs, vegetables, cheese, fruits, meats and fish are stored . . . then watch food spoilage go down and profits go up.

Let General Ozone engineers solve your odor and mold problems. General Ozone has a complete line of modern ozonizing equipment plus full service facilities for both old and new types. Write us today for further information.

GENERAL OZONE CORPORATION

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Approved by Underwriters' Laboratories, Inc.

Manufacturers of ozone generating equipment for cold-storage • warehouses refrigerated cars • walk-in coolers • air recirculating systems • homes • garages • hospitals

WEATHERPROOFED ICE SIGNAL CARDS

Coated Both Sides With Paraffine

ANY COLOR

ANY SIZE

We Make Any Design of Ice Signal Card

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LaPorte, Indiana

UNBEATABLE PERFORMANCE

LOW VOLUME HIGH HEADS

"1001" uses in INDUSTRY

APCO TURBINE-TYPE PUMPS

The ONLY MOVING PART in the APCO

APCO SINGLE STAGE

APCO TWO STAGE

These, the simplest of all pumps, are of the multivane, double-suction, hydraulically balanced turbine-type and unsurpassed for long-lived service on low capacity, high head duties. Ideal for a wide variety of duties in industry. Embody an impressive array of valuable characteristics found only in this highest development of the Turbine-Type Pump. Available, too, are Water-Jacketed Apcos for hot liquids and Stainless Steel (in stock) Apcos for corrosive liquids.

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AURORA CENTRIFUGAL PUMPS
A complete line, notable for streamline coordination between impellers and shells, including Single and Two Stage Horizontally Split Case, Side Suction, Vertical, Non Clog, Sump, Mixed Flow, Special Design, etc.

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REFRIGERATION SPECIALISTS
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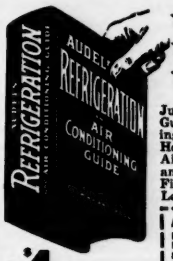
Ice Making and Refrigeration - Industrial Power Plants
Reports, Appraisals and Management



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Just Out! Audels Refrigeration & Air Conditioning Guide for Engineers, Servicemen & Shopmen. Covering Principles, Servicing, Operation & Repairs of Household Special, Commercial & Industrial Units & Air Conditioning. 1280 Pages. All Fully Illustrated and Indexed for Ready Reference. Valuable Facts & Figures including data on Freon, Quick Freezing, Lockers, Water Coolers & Air Conditioning Systems.

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General Filter Joins Layne & Bowler

LAYNE and Bowler, Inc., vertical turbine pump manufacturers in Memphis, Tenn., and its sixteen affiliated well water supply companies, announces the latest addition to the Layne organization, General Filter Co. of Ames, Iowa.

General Filter Company was organized in 1935 by J. P. Lawlor, a former Layne engineer. He is to remain as president. The new board of directors is Lee Rogers, Layne-Minnesota Co.; J. P. Lawlor, General Filter Co.; S. L. Olson, Layne-Texas Co.; A. W. Ross, Layne-New York Co.; M. H. Anderson, General Filter Co.; T. M. Ragsdale, Layne-Central Co.; and A. G. Schreiber, General Filter Co.

This is a company of engineers and chemists devoted to the broad field of water conditioning. Using a wide variety of methods ranging from aeration to demineralization, they treat any type of water to meet the increasingly high standards required by municipalities and industries. This affiliation gives General Filter distribution facilities second to none in the water treatment field.

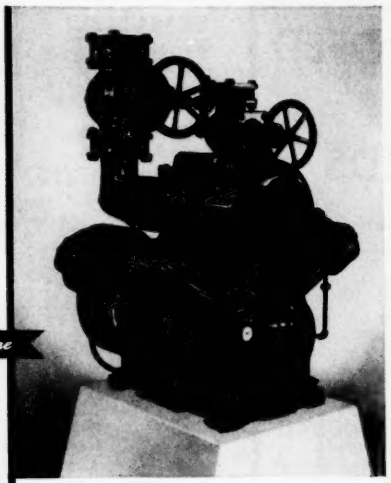
Ahern New V.P. Pacific Fruit Express

CHARLES AHERN, who started with Pacific Fruit Express Co. as a clerk in 1918, has been appointed to the newly created office of assistant vice-president and general manager, effective February 16, it was announced by K. V. Plummer, vice-president and general manager of the company.

A. L. Holst, superintendent of the car service department in Los Angeles, who started with PFE in the company's ice plant in Roseville in 1917, has been named to succeed Mr. Ahern as assistant general manager of the car service department.

Whatever You Need in Refrigeration

Creamery Package



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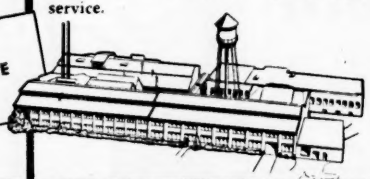
CP offers you an extensive line of vertical two-cylinder Compressors, Self-contained Marine Units and Multi-cylinder Compressors and Boosters plus CP Engineering to cooperate in planning efficient economical refrigeration systems.

The modern CP factory (pictured below), which is devoted exclusively to the manufacture of refrigeration machinery, combines with a coast to coast network of 21 company owned and operated branches to give owners of CP Refrigeration Equipment the important advantage of one source of *complete* supply and service.

The Home of CREAMERY PACKAGE REFRIGERATION



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CREAMERY PACKAGE MFG. CO. OF CANADA, LTD.
267 King St., West, Toronto 2, Ontario

THE CREAMERY PACKAGE MFG. COMPANY, LTD.
Avery House, Clerkenwell Green, London, England

CATALOGS AND BULLETINS

Gifford-Wood Bulletins

A NEW bulletin has been issued by Gifford-Wood Co., makers of ice tools, illustrating and describing equipment for the ice industry and conveyors for the dairy and food industries. The line includes tongs, shavers, bars, hooks, ice breakers and sizing units, scoring machines, comprising a complete list of handling equipment.

Another informative bulletin illustrates and describes the new type A automatic ice cuber. With this device the operator slides an ice cake into the carriage of the cuber at floor level and the operation of cutting cubes is done automatically.

Bulletin on Fan Heater

A BULLETIN has been issued by the Niagara Blower Co., describing their new high pressure steam fan heater which utilizes both the sensible and latent heat of high pressure steam. With the patented Niagara dual coil system, complex piping, pressure reducing stations and other accessories are done away with. Other features are described and illustrated with photographs and diagram.

New Bulletin on Water Conditioning

A new 8-page bulletin on Chemicals for Conditioning aqueous systems has been issued by Wright Chemical Corp., Chicago, Ill. It goes into detail on water conditioning, scale control and corrosion inhibition and recommends chemicals for particular application. For those interested in the subject this bulletin has information of considerable value.

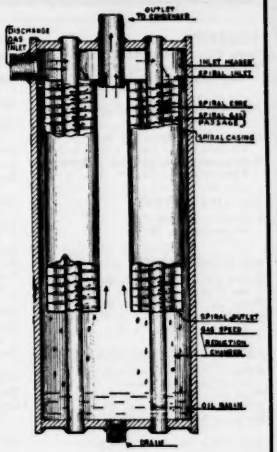
"King Zeero"

OIL SEPARATOR

STOPS OIL FROM ENTERING CONDENSER RECEIVER AND LOW SIDE

Allows operation as was originally intended. Simple in operation — no parts to wear out — no screens, metal wool or any close screens to clog, raise discharge pressures and cut down capacity.

When used in connection with air compressors, water is also separated with the oil.



Built for years of trouble free service. Mechanical details on request.

THE KING ZEERO COMPANY
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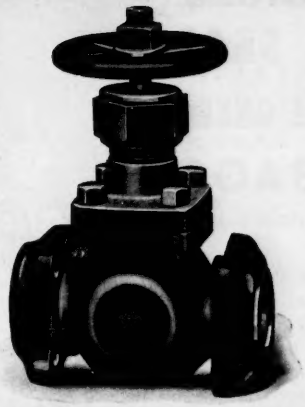
Est. 1880

"THE OLDEST NAME IN REFRIGERATION"



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- **AMMONIA VALVES** Flanged and screw ends in all sizes from ¼" to 8"
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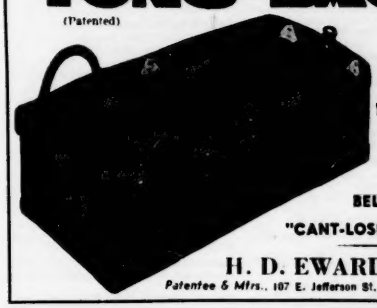
TONG-BAGS

(Patented)



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"COOL-RITE" MILK CASE BAGS

"SNUG-FIT" BELT PURSES

"CANT-LOSE" WALLETS

H. D. EWARD CO.

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Only the Highest Quality Merchandise and efficient service necessary for the proper and profitable operation of your business. Write for our 1949 catalog.

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WE CONTINUE YEAR AFTER YEAR
to make the kind of Ice Picks that will give YOUR customers satisfaction and build up GOOD WILL FOR YOU.

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Deliver SIZED ICE in Style!

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TREATED CANVAS
AND
NO-FADE GREEN
TREATED CANVAS
ICE BAGS

ATTRACTIVE... HUSKY... Sanitary containers.

BUILD MORE BUSINESS! Lower your costs, too, with "STAG BRAND" Metal Bottom Ice Bags. They are "tops" from any angle.

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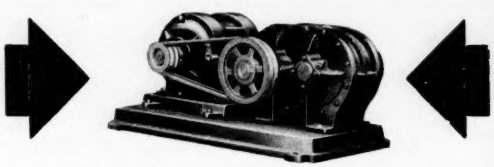

Breezes or Cyclones with R-C BLOWERS

You can have any amount of air you need when you use R-C Blowers. We build them from 10 CFM up to any desired capacity—with pressures to suit your specific needs and with direct-connected motor, V-belt or other drive.

You determine the volume of air and pressure you want, and your R-C Blowers will deliver it—just as these sturdy, simple, dependable units have been delivering for ice plant operators for many years.

You'll need to move promptly for this season's operations. Send for details in Bulletin R-C 1247, or we'll help you select an R-C Blower to match your needs.

ROOTS-CONNERSVILLE BLOWER CORP.
905 Columbia Avenue Connersville, Indiana
One of the Dresser Industries

ROOTS-CONNERSVILLE BLOWER BUILDERS SINCE 1854

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Greene, Van R. H., New York, N. Y.
Ophuis & Associates, Fred, New York, N. Y.

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Phillips & Co., H. A., Chicago, Ill.
Rex Engineering & Sales Co. Oklahoma City, Okla.
Reynolds Electric Co., River Grove, Ill.

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Union Bag & Paper Corp., New York, N. Y.
United Ice Supply Co., Boston, Mass.

BAGS, WATERPROOF PAPER
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Reynolds Mfg. Co., Springfield, Mo.
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Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.

CHEMICALS
Berado & Page, Inc., Kansas City, Mo.
Wright Chemical Corp., Chicago, Ill.

COAL HANDLING MACHINERY
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Creamery Package Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburg Pipe Coil & Bending Co., Pittsburg, Pa.

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Armstrong Cork Co., Lancaster, Pa.
Frick Co., Waynesboro, Pa.
Mundet Cork Corp., Brooklyn, N. Y.
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Vogt Machine Co., Henry, Louisville, Ky.

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Howe Ice Machine Co., Chicago, Ill.
Kehoe Machinery Co., Inc., R. P., New York, N. Y.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Pittsburgh, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.

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Ophuis & Associates, Fred, New York, N. Y.

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Lilly Co., The, Memphis, Tenn.
Link-Belt Co., Chicago, Ill.

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CORK INSULATION
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COUPON BOOKS
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Vivian Mfg. Co., St. Louis, Mo.

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Cork Import Corp., New York, N.Y.
Mundet Cork Corp., Brooklyn, N.Y.

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Worthington Pump and Machinery Corp., Harrison, N. J.

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Knickerbocker Stamping Co., Parkersburg, W. Va.
Martocello & Co., Jos. A., Philadelphia, Pa.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Refrigeration Engineering Corp., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

DISPLAY CASES
Trusty Manufacturers, Inc., La Porte, Ind.

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DUMPS, CAN
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Gifford-Wood Co., Hudson, N. Y.
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Martocello & Co., Jos. A., Philadelphia, Pa.
Ohio Galvanizing & Mfg. Co., Niles, Ohio

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ANNOUNCEMENT...

RECO ICE PLANTS

★ We have expanded our manufacturing facilities—completely redesigned our line of Ice Plants so as to produce packaged fast freezing, complete Commercial Block Ice Plants available in a wide range of capacities for prompt shipment.

★ Augmentation of our facilities was necessary because of wide recognition and resultant greatly increased demand for RECO Ice Making and Cold Storage Equipment. Ice Making Equipment is in great demand today —everyone recognizes the function of Ice for the preservation of public health and food stuffs.

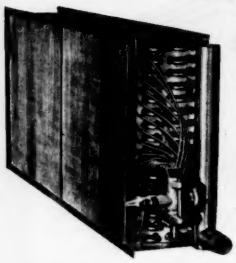
★ As a result of our redesign and augmentation of production facilities, we have determined that for Plants using comparable high quality materials and advanced engineering design, you will find no lower prices than those submitted by RECO. That is our policy.

Write for Quotations. Distributorships available to qualified firms.

(REFRIGERATION ENGINEERING CORPORATION)
RECO PRODUCTS DIVISION
2020 NAUDAIN STREET PHILA. 46, PENNA
RECO

Philadelphia Pipe Coils
ESTABLISHED 1880
Continuous Welded Pipe Coils of Any Metal, Size or Design
PHILADELPHIA PIPE BENDING CO.
FIFTH STREET & N. P. R. R
PHILADELPHIA

$26.00 per ton
Average Cost



REMPE
Air Conditioning Coils

Quality—Custom-built—Precision Designed for Correct Refrigerant Velocity and Balanced Load on all Circuits in 85° to 60° air cooling range.

All Rempe Air Conditioning Coils are complete with Multi-Port Thermal Expansion Valve.

Available in sizes 2 to 15 tons for use with Freon and Methyl. Coils 10 ton and over are furnished in 2 sections for easy installation.

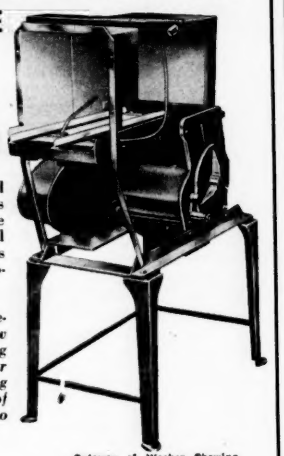
Write or wire for price and specifications on size and capacity of fin coil needed.

REMPE CO.

348 No. Sacramento Blvd., Chicago

Pipe and Fin Coils for Refrigeration and Air Conditioning.

Wash Up COMPLAINTS OF DIRTY ICE AND UNSANITARY
CRUSHING WITH THE *Bateman* AUTOMATIC WASHER - CRUSHER



. . . Saves time, labor and money in that it requires no extra time to wash ice and uses only a small amount of water. It is safe, sanitary and automatic.

Crusher has a plate to remove drum to install new teeth without dismantling machine. Grate has four adjustments by turning handle to desired size of ice, from drug store size to 1¾ inches.

Cutaway of Washer Showing Automatic Valve.

MODEL NO. 50

Model No. 50 for 50 pounds ice, less motor	$277.75
Galvanized	add $20.00
¾ H.P. Motor, Single Phase	$46.60
¾ H.P. Motor, 3 Phase	$42.60

MODEL NO. 25

Model No. 25 for 25 pounds ice, less motor	$176.50
Galvanized	add $16.00
¼ H.P. Motor	$25.00
½ H.P. Motor	$35.00

BATEMAN FOUNDRY & MACHINE CO., INC.
Mineral Wells, Texas

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Frick Co., Waynesboro, Pa.

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EVAPORATORS
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Frick Co., Waynesboro, Pa.
Niagara Blower Co., New York, N.Y.
Vogt Machine Co., Henry, Louisville, Ky.

FEED-WATER HEATERS
National Pipe Bending Co., New Haven, Conn.
Vogt Machine Co., Henry, Louisville, Ky.

FIBERGLAS
Armstrong Cork Co., Lancaster, Pa.

FIELD ICE SAWS
Gifford-Wood Co., Hudson, N. Y.
United Ice Supply Co., Boston, Mass.

FILTERS, WATER
Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A., Philadelphia, Pa.

FIN COILS
Acme Industries, Inc., Jackson, Mich.
Howe Ice Machine Co., Chicago, Ill.
Rempe Company, Chicago, Ill.

FIRST AID SUPPLIES
Acme Protection Equipment Co., Chicago, Ill.

FITTINGS
Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A. Philadelphia, Pa.
Rempe Company, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

FOOD FREEZING EQUIPMENT
Baker Refrigeration Corp. So. Windham, Maine
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
Worthington Pump and Machinery Corp., Harrison, N. J.

FROZEN FOOD LOCKERS
Frick Co., Waynesboro, Pa.
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Rempe Company, Chicago, Ill.

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National Pipe Bending Co., New Haven, Conn.

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Worthington Pump and Machinery Corp., Harrison, N. J.

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Thomas Truck and Caster Co., Keokuk, Iowa

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Union Bag & Paper Corp., New York, N. Y.

ICE BLOWERS
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Link-Belt Co., Chicago, Ill.

ICE CAN FILLERS
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Kehoe Machinery Co., Inc., R. P., New York, N. Y.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Martocello & Co., Jos. A., Philadelphia, Pa.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Refrigeration Engineering Corp., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

ICE CANS
Frick Co., Waynesboro, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
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Ohio Galvanizing & Mfg. Co., Niles, Ohio
Refrigeration Engineering Corp., Philadelphia, Pa.

ICE CHIPPERS
Gifford-Wood Co., Hudson, N. Y.
Martocello & Co., Jos. A., Philadelphia, Pa.
Refrigeration Engineering Co., Minneapolis, Minn.
Refrigeration Engineering Corp., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Jamison Cold Storage Door Co., Hagerstown, Md.
Link-Belt Co., Chicago, Ill.
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ICE CONVEYORS
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Refrigeration Engineering Co., Minneapolis, Minn.
United Ice Supply Co., Boston, Mass.

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United Ice Supply Co., Boston, Mass.

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Pittsburgh Waterproof Co., Pittsburgh, Pa.
Union Bag & Paper Corp., New York, N. Y.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Gifford-Wood Co., Hudson, N. Y.
United Ice Supply Co., Boston, Mass.

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Pace Brothers, Los Angeles, Calif.
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Worthington Pump and Machinery Corp., Harrison, N. J.

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United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Refrigeration Engineering Corp. Philadelphia, Pa.

ICE RECORDING MACHINERY
Jamison Cold Storage Door Co., Hagerstown, Md.

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Martocello & Co., Jos. A., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

ICE TOOLS
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Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Martocello & Co., Jos. A., Philadelphia, Pa.
United Ice Supply Co., Boston, Mass.
Vivian Mfg. Co., St. Louis, Mo.

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Dickinson & Co., F. B. Des Moines, Ia.
Frick Company, Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Jamison Cold Storage Door Co., Hagerstown, Md.
Refrigeration Engineering Co. Minneapolis, Minn.
S & S Vending Machine Co., San Jose, Calif.
Thermo Cuber Co., Chicago, Ill.

ICED DISPLAY CASES
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National Pipe Bending Co., New Haven, Conn.

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American Hair & Felt Co., Chicago, Ill.
Armstrong Cork Co., Lancaster, Pa.
Cork Import Corp., New York, N. Y.
Mundet Cork Corp., Brooklyn, N. Y.
Pacific Lumber Co., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.

JACK TUNG, TRUCKS
Thomas Truck and Caster Co., Keokuk, Iowa

LOW TEMPERATURE EQUIPMENT
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MASKS, AMMONIA
Acme Protection Equipment Co., Chicago, Ill.

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Ohio Galvanizing & Mfg. Co., Niles, Ohio
The Mote-Truc Co., Cleveland, Ohio
Thomas Truck & Caster Co., Keokuk, Iowa

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BAKER
AIR CONDITIONING AND REFRIGERATION
in Freon and Ammonia

EFFECTIVE SERVICE
through
BAKER DISTRIBUTORS
backed by large plants at
Omaha, Nebraska
and
South Windham, Maine

BAKER REFRIGERATION CORPORATION
(Formerly BAKER ICE MACHINE CO., INC.)
General Offices: South Windham, Maine
Factories at Omaha, Neb. and So. Windham, Me.

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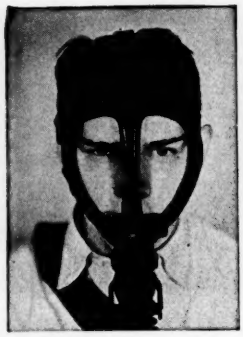
Another Phillips Product
. . . PILOT OPERATED LIQUID CONTROL VALVE
May be piloted by either float, thermal or electric valve.

The recognized higher efficiency rate of a flooded operated evaporator in a refrigerating or air conditioning system is further emphasized when the evaporator is used in conjunction with Phillips Float Controls. Maximum B. T. U. transfer is assured. These controls respond so instantly to any wide variations in load that their use is indicated on practically all installations. Available capacities: Freon, 20 to 500 tons; Ammonia, 1 to 2000 tons. For high or low side applications. Write for NEW Bulletin.

The Home of Phillips Regulating Valves and Float Controls
Established in 1929

H. A. PHILLIPS & COMPANY
1255 W. CARROLL AVE. CHICAGO, ILLINOIS



ONE LOOK...

AND YOU *SEE* THE DIFFERENCE

With Acme Full-Vision Gas Masks

Here's protection against ammonia and other gases—without sacrifice of normal vision. Acme's larger lenses give you full vision in all directions. Another exclusive difference is Acme's Dead Air Check Valve which limits the amount of carbon dioxide the wearer rebreathes. For protection against ammonia, the No. 4 Acme Mask with the No. 3 AM canister is approved by the U. S. Bureau of Mines.

Write for illustrated bulletins.

ACME PROTECTION EQUIPMENT CO.

3037 West Lake Street • Chicago 12, Illinois

A Handy Tool - WRIGHT'S HEAD-BACK PRESSURE CALCULATOR

Actual Size
3½ in. square

Post Paid
$1.00

The Head-Back Pressure Calculator quickly determines the proper head pressure, for various refrigerants when the suction pressure, room temperature or mean water temperature is known.

Such variable conditions as the suction pressure, room temperature, water inlet and outlet temperature, kind of gas used, etc., all enter in determining the proper head pressure.

NICKERSON & COLLINS COMPANY

433 N. Waller Ave. CHICAGO 44, ILL.

THE BUYERS

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Texas Co., The, New York, N. Y.

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Vogt Machine Co., Henry, Louisville, Ky.

WELL SCREENS
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WROUGHT IRON PIPE
Byers Co., A. M., Pittsburgh, Pa.

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A handy book containing a surprising amount of useful data required in everyday practice.
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Whether your next job be for a single bend, or coil or complete piping system, Chicago Nipple can supply your requirements. Experienced workmen, practical engineers, and modern equipment reflect the quality of our products.

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All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for the purchase and sale of USED equipment, existing and used plants, and surplus material. Rates: $3.50 for 50 words or less; 60c for each additional 10 words or fraction thereof; 75c per line for bold face headings; $9.00 per inch for ads all set in bold face type or listing items on separate lines.

POSITIONS AND HELP WANTED

WANTED—Shift engineer for electric-driven ice plant; 250 ton daily capacity. In reply, give experience. Globe Mills, Inc., El Paso, Texas.

WAREHOUSE EXECUTIVE—employed in permanent position as warehouse manager, desires to relocate, preferably in midwest or central states. Approximately twenty years in refrigerated and general merchandise warehousing, with general business training and background. Progressive, responsible, good habits and health, and excellent references. Address Box AP-20, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

POSITION WANTED—as chief engineer or superintendent of the refrigeration facilities for a brewery, meat packing plant, chain of ice plants, railroad car icing system or similar organization. Am a young married man, veteran of the last war. Have had fifteen years experience in the design, erection and operation of refrigerating machinery, covering almost every phase of its application. I will gladly furnish, upon request, any information desired as to my character, experience and ability. Address Box MY-7, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

ICE PLANTS—*Wanted and For Sale*

FOR SALE—20 ton ice plant complete. Reasonably priced. To be moved from present building. Also two gas engines and generators, 90 and 125 h.p. L. E. Wylie, Route 7-453, Oklahoma City, Okla.

FOR SALE—15 ton ice making plant and business. York equipment, electric or Diesel. Cement block building, storage, crane, softener, air agitator, crusher, scales, office equipment, good trucks, miscellaneous equipment, 21 cash & carry houses; serves 2 cities. Reasonable; terms. Selling—poor health. L. D. Decker, Realtor, Alma, Michigan.

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WANTED and FOR SALE ADVERTISEMENTS

USED MACHINERY—*Wanted and For Sale*

WANTED—In the market for any good used refrigerating and ice making equipment you may have for sale. Address Box DC-19, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—700 used ice cans, in grids of 5, for York high pressure system. Inside measurement, 11"x22"x49". Good condition. Camden Refrigerating & Terminals Co., Kaighn Ave. and Delaware River, Camden, New Jersey.

FOR SALE—Shepard-Niles 1½ ton crane, equipped for 5 can lift. Camden Refrigerating & Terminals Co., Kaighn Ave. and Delaware River, Camden, New Jersey.

FOR SALE—One brand new 8"x8" latest type Worthington ammonia compressor with new horizontal tubular condenser. Can ship immediately. Address Box MY-2, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—1 York 6"x6" compressor, V-belt and 20 h.p., 3/60/220V motor 15' double pipe condenser, gauges and valves. Consolidated Products Co. Inc., 13-21 Park Row, New York 7, N. Y.

FOR SALE—Forged brass fittings, ¼" IPS x ⅜ flare No. 445 KEROTEST angle valves 95 cents each. ½" IPS x ¾ flare 90° elbows 25 cents each. FOB Chicag C. B. Goodman & Co., 6459 S. Morgan St., Chicago, Ill.

FOR SALE—Good used machinery. Diesel engines 80 h.p., 140 h.p., 180 h.p., generators, cooling tower, blower, crane, hoists, pumps, motors 1 h.p. to 30 h.p., 3x3 twin Frick self-contained unit. Write for detailed list of equipment and prices. David J. Copeland, P.O. Box 575, Richmond, Kentucky.

WANTED—A 250 ton, two stage compressor, at 20 lbs. back pressure and 190 lbs. discharge pressure, 3 phase, 440 volts, 60 cycle, synchronous motor. Address Box MY-14. Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Two 75 h.p. Westinghouse squirrel cage induction motors. 60 cycle 3 phase 220-440 volts with reduced voltage starters. One Fairbanks-Morse 4" centrifugal pump complete with 25 h.p. motor type OZK. Bedford Home Artificial Ice Co., Bedford, Indiana.

FOR SALE—Two 8x8 Sterling, 2-cylinder vertical ammonia compressors, latest type, with grooved flywheels. Never used since shipped from factory. Must make room. Bargain. Address Box MY-6, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—Two 36"x15' vertical shell and tube ammonia condensers, 2" tubes 1120 sq. ft. surface. One 30"x16' ditto 806 sq. ft. all completely retubed. One 8"x8" York high speed vertical twin ammonia compressor—completely reconditioned, new bearings, piston rings, shaft packing, etc., with grooved wheel. Michigan Ice Machine Co., 617 E. Fort St., Detroit 26, Mich.

FOR SALE—Four Vertical shell and tube ammonia condensers, each 42" dia. x 14' high, with 180—2" dia. x 14'—#10 gauge charcoal iron tubes—with 4" gas, 1½" liquid and 1" equalizer outlets—½" purge valve and ½" pop valve—500# pressure—1260 sq. ft. Were in regular use until replaced recently by evaporative condensers. Addres Box MY-18, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—1416—300-lb. 11"x22"x50" ice cans with 18-can baskets; ice tanks, hydraulic-operated dumper, can filler, electric crane, 24' span; air compressors, drop tubes, headers and lateral low-pressure drop tubes, wood can covers, brine coolers, etc. for immediate shipment. Ice crusher sizing machine, 3 100-KW transformers 4000 to 440 volts. Dasco, 1307 St. Clair Av., Cleveland 14, Ohio.

FOR SALE—385 ice cans—11"x22"x49" inside measurements, now in use and in good shape, price $4.00 each. One 9x9 used horizontal Vilter ammonia compressor, 60 h.p., 440 volts, synchronous motor, starter switch and panel. One vertical Frick 8x8 ammonia compressor, slow speed 50 h.p. motor, slip ring, 440 volts. Prices for the machines will be furnished on request. Electric Ice Company, Craft Highway & G.M.&O.R.R., Prichard, Ala.

FOR SALE—1—20 ton Arctic-Pownall complete ice making plant including two 9x9 compressors. York 9x9. Frick 6x6. York 5x5 self-contained unit. Baker 4½x5 self-contained unit. Creamery Package 4x4 self-contained unit. 1 ton York flake ice. 1 h.p. Frigidaire Freon 30 h.p. GE motor. 1¼x5" return bends, freezer doors, pipe coils, ammonia fittings. Frick 10x10 crankshafts, with pistons. 1 each 150 and 180 h.p. Fairbanks-Morse Diesel engines; 1 each 40 and 60 KVA A.C. generators complete. Parke Pettegrew & Son Co., 370 W. Broad St., Columbus 8, Ohio.

FOR SALE—York compressors all sizes from 3x3 to 9x9, splash lubrication. 3x3 and 4x4 self-contained units. Two 10 h.p. Freon units with 8 blower units, suspended type. Four 8" x 18' shell & tube Vogt condensers, seven 2" tubes in each shell, 40 ton capacity. One 10 ton, one 15 ton Vilter shell & tube condensers. One 16" x 10' receiver. One 20 ton York float with by-pass. Eight 1-¼" Alco magnetic valves. Write E. Niebling, 1318 St. Clair Ave., Mt. Healthy Cincinnati 31, Ohio.

FOR SALE

Rebuilt Frick 7" x 7" compressor, 300 r.p.m., with 40 h.p., 1200 r.p.m. motor, starter, V-belt drive $1500.00
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Two Reconditioned 6" x 6" Worthington, two cylinder compressors, with flywheels, new style, high speed, four months actual service. New compressor guarantee ..... $1350.00 each.

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Compressor: 2 cylinder, 15" bore by 30" stroke. Engine: one high pressure cylinder, 20" bore by 30" stroke; one low pressure cylinder, 42" bore by 30" stroke. Model: 16635. Capacity; 325 tons in 24 hours at 80 r.p.m. and 35 lbs. suction. Requires 250 h.p. boiler (not included). Condition is excellent, having been completely overhauled recently. Has been operated occasionally since overhaul, as a stand-in only. Included in sale price is the following equipment: 1 water pump, 1 team condenser, 1 vacuum pump—all in first class condition. PRICE $10,000.00 as described and as located in our plant at Hawaii Brewing Corporation, Honolulu. Write or phone

CREAMERIES OF AMERICA, INC.
320 Roosevelt Bldg. Phone: Michigan 6041 Los Angeles 14, Calif.

FOR SALE—ICE PLANTS

1—30 ton York ice plant, electric driven, 4-can pull.
1—20 ton York ice plant, Diesel driven, 2-can pull.
1—12 ton York ice plant, electric driven.

COMPRESSORS

1—16x18 York direct connected to 375 h.p. synchronous motor.
1—11x13 York direct connected to synchronous motor, F.F. lubrication.
1—10x10 Frick direct connected to synchronous motor, F.F. lubrication.
1—7½x7½ York, 225 r.p.m. high speed valves.
1—7x7 Frick, F.F. lubrication, 360 r.p.m.
1—6½x6½ York F.F. lubrication, 360 r.p.m.
1—6¼x6¼ Baker, F.F. lubrication, 360 r.p.m.
1—6x6 Frick F.F. lubrication, 360 r.p.m.
1—6x6 York Y-15 model.
1—5x5 York self-contained unit.
1—5x5 Frick, 277 r.p.m.
2—3x3 or 4x4 York or Frick self-contained units.
1—40 h.p. Diesel engine.

Vertical, horizontal condensers, brine coolers of all sizes. Brine Pumps, valves, fittings, electric motors, air blowers and miscellaneous equipment. All equipment rebuilt and guaranteed. Send us your requirements.

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Phones: Mitchell 3-7790 3-7791 Cable Address "BERECO"

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1—50 Ton York Ice Plant, Electric Driven, Herringbone coils, late type.
1—50 Ton York Ice Plant Electric Driven, Herringbone coils, late type.
1—14"x16" 3 cylinder York ammonia compressor direct connected to 300 HP G.E. synchronous motor.
2—12½"x14½" 2 cylinder York ammonia compressor direct connected to 150 h.p. G.E. synchronous motor.
1—10"x10" York ammonia compressor high speed.
1—10"x10" 2 cylinder Frick compressor high speed.
1—9"x9" 2 cylinder Frick compressor medium speed.
1—6½"x6½" two cylinder York ammonia compressor high speed.
1—6"x6" two cylinder Frick ammonia compressor medium speed.
2—6"x6" two cylinder late model h.s. York compressors.
1—6"x6" two cylinder Voss high speed ammonia compressor.
1—5"x5" two cylinder York high speed ammonia compressor.
2—4"x4" two cylinder York high speed ammonia compressors.
1—3"x3" two cylinder Frick unit, high speed.
1—3"x3" one cylinder York unit, high speed.
2—48½"x16'-0" Shell and Tube ammonia condenser, 203—2" tubes.
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York shell and tube condenser 28" dia. x 16' L, 51 2" tubes.
1—25" dia. x 10' 0" long 5 pass enclosed type ammonia condenser.
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1—40" x 15' lge. 8 pass enclosed type shell and tube brine cooler having 112 2½" tubes.
2—Perfection Ice Scoring Machine, 300-ib. blocks.
500—11" x 22" x 48" ice cans.

All makes and types recording thermometers, shell and tube double pipe condensers. Send us your requirements.

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Electric motors, starters and panel boards, all sizes, ice cans, agitators, cranes, pumps, low pressure blowers, valves and fittings.

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3 Ingersoll-Rand compressors 50, 90 and 100 tons, direct connected to synchronous motors. 1 York 6½ x 6½ high speed compressor. 1 York 6½ x 6½ slow speed compressor. Ice cans, ammonia pipe, return bends, pumps, electric cranes and high pressure boilers.

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- sell a Plant

RESULTS HIGH --- RATES LOW

USED ICE MACHINES AND EQUIPMENT

All Used Equipment Is Reconditioned in Our Modern Machine Shop

THIS IS ONLY A PARTIAL LIST—WRITE ABOUT ANY REQUIREMENTS WHICH YOU HAVE WE ARE BUYING ADDITIONAL EQUIPMENT ALL OF THE TIME.

Compressors with or without motors	Item No.
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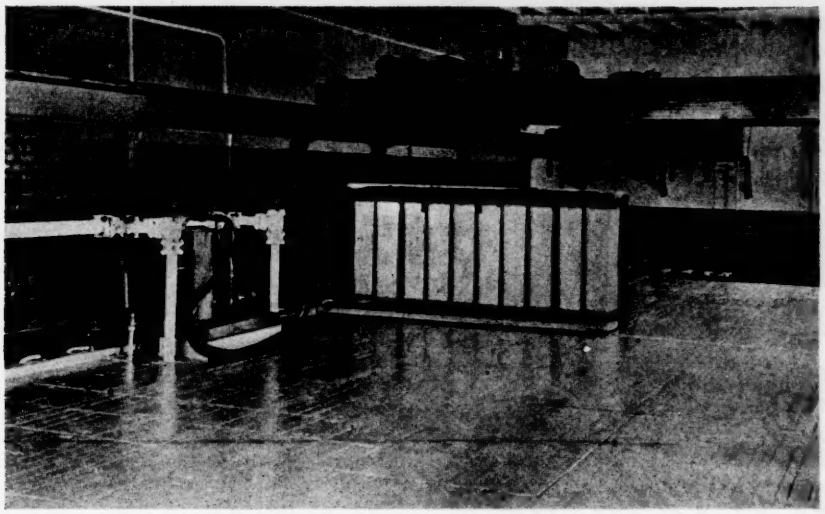
50 TON SECOND HAND YORK ICE MAKING PLANT

10 Can Grid System



Major Component Parts---Listed

1—10x10 medium speed York, running at 240 RPM—with 100 HP slip ring motor, reconditioned—3/50-60/220-440
1—9x9 200 RPM York, with 50 HP reconditioned motor—3/50-60/220-440
1—100 ton shell & tube condenser, retubed and tested—vertical
1—York trunk coil—for tank
1—Oil separator and receiver
600—11"x22"x50" ice cans—arranged in 10 can grids. Cans to be refinished in zinc.
1—Brand new ice tank
1—10 can dip tank
2—3 HP vertical agitators—brand new
1—Automatic 10 can filler
1—2½ ton Sheppard Niles crane—for 10 cans at one time
1—Complete high pressure aerating system
1—Pennsylvania air compressor—with 20 HP motor—3/50-60/200-440

All necessary pipes, valves, and fittings are included with this plant, to make necessary connections from tank, to compressors, condenser, receiver, etc. etc.

Robert P. Kehoe Machinery Company, Inc.

REFRIGERATION EQUIPMENT

1 EAST 42nd STREET, Corn Exchange Bank Building
NEW YORK 17, N. Y.

PHONE: VAnderbilt 6-0881-2-3
CABLE ADDRESS: Kehoeinc

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BUTCHER BOY COLD STORAGE DOOR CO.
170 N. SANGAMON ST., CHICAGO 7, U. S. A.

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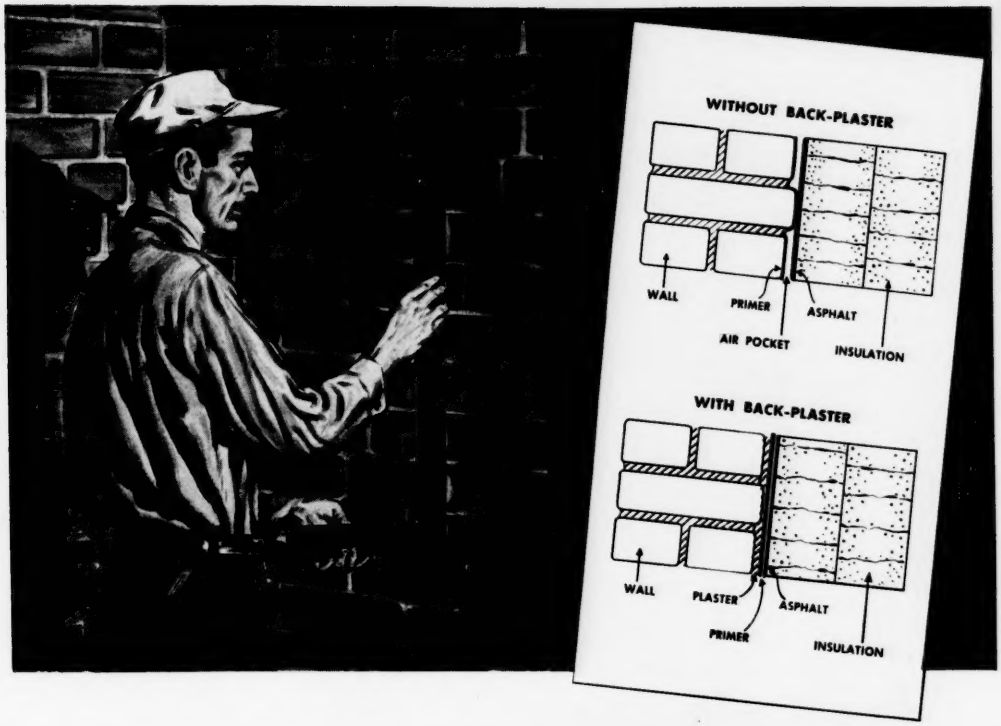


Does it pay to back-plaster?

To the eye, a wall against which you're going to erect insulation may look smooth enough. Why go to extra trouble and expense to cover it with back-plaster first?

Run a straightedge over the surface of that wall, and you'll quickly discover the reason. Hollows and high spots will show up, leaving "pockets" through which you can see light.

If you lay up corkboard against the wall as it is, two things can happen: (1) the hot asphalt will adhere only to the high spots, so the bond between insulation and wall will be weakened; (2) vapor from outside will eventually collect in these pockets. If temperatures are low, the vapor will freeze, bulge out the insulation, and destroy its efficiency.

These aren't theories. They are facts observed by Armstrong's engineers during the more than 40 years Armstrong has been handling low-temperature insulation work. Like every other Armstrong specification, back-plaster is based on broad experience as well as good engineering practice.

When you have a low-temperature insulation job coming up, talk it over with an Armstrong engineer. He's near by, in one of Armstrong's district offices. A phone call will reach him. And when you entrust your insulation work to Armstrong's Contract Service, you'll get good materials and fine workmanship as well as sound engineering advice.

For full details, write today to Armstrong Cork Company, 4505 Concord Street, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

From 300° Below Zero

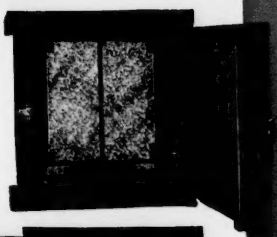
To 2800° Fahrenheit

You can cut

REFRIGERATION COSTS

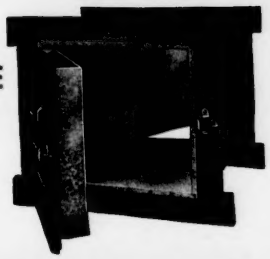
When Handling

CANS, CRATES, KEGS



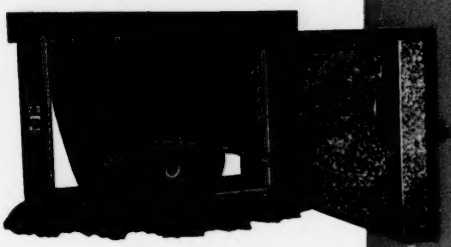
CAN AND CRATE PASSING DOOR

The Auto Close doors swing open readily and close automatically when the cold storage doors open. This checks the inrush of warm air and saves refrigeration. The door can be fitted into a conveyor system or used with its own roller conveyor.



ICE CREAM CAN PASSING VESTIBULE

The vestibule is equipped with a cold storage door at each end. Maximum loss of cold air is limited to the volume of the vestibule because either door is always closed whether loading or unloading. Vestibule holds six to nine cans in various arrangements.



KEG PASSING DOOR

A flexible light weight insulating curtain of moulded material prevents the loss of cold air when the door is open. The movement of the keg lifts the curtain without shock or abrasion as it passes. It immediately drops back in place and air movement is cut off.

These Jamison-Built Doors permit the speedy passing of cans, crates, boxes, packages or kegs in and out of the refrigerated space. Each of the methods illustrated is particularly well suited to the temperatures and type of container. The loss of cold air and the entry of warm air during the time containers are moved in and out of refrigerated storage rooms is held to a minimum. The resulting savings in refrigeration costs can be substantial.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

Standard types of Jamison-Built doors are available for a wide range of temperatures and applications. For special requirements doors can be built to your specification regardless of size, character or duty.

Write for new catalog that gives helpful information on cold storage door selection.

JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MD.

The Oldest and Largest Builders of Cold Storage Doors in the World